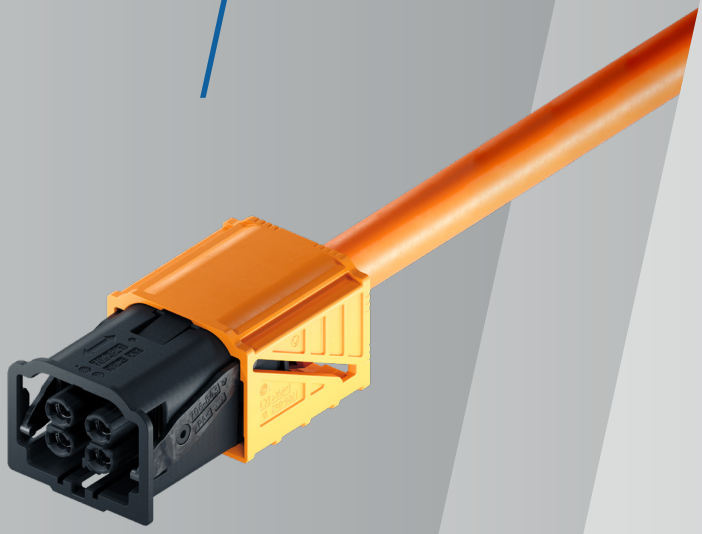


PROCESS SPECIFICATION

HPS40 4+2
Female Connector MCC

EVS-100108

HIRSCHMANN
AUTOMOTIVE

TABLE

1 General

1.1 Introduction

This process specification is valid for all variants and describes the product structure as well as the assembly of the HPS40 4+2 female connector.

System number	Coding	Wire cross section	Remark
809-981-501	A	4x 6.0 mm² 4x 4.0 mm² 3x 6.0 mm² 3x 4.0 mm² 2x 6.0 mm² 2x 4.0 mm²	with HVIL
809-981-502	B		
809-981-507	Z		
809-981-511	A		without HVIL
809-981-512	B		
809-981-517	Z		

The manufacturer of the listed products is responsible for the qualitative processing and the accuracy of the version. In the case of improper processes or deviation from specification that results in quality issues, the right of complaint is void.

1.2 Customer releases

It is our suggestion that the specified dimensions are observed during processing. Further functional features must be coordinated and defined with the OEM. The adjustments in the processing specification with the status 10/ 2023 must be considered for new applications, but not for existing applications.

1.2.1 Customer: Miscellaneous

Customer: Miscellaneous					
L	**S**	**F**	**Characteristic**	**Specific purpose**	**Place of implementation**
L1	-	-	Wire shield pressing	Shield contact – EMC and pull-off force	Manufacturer
-	-	F1	Press-in dimension	Pluggability	
L2*	-	-	Shielding pull-off force	Shield contact – EMC and pull-off force	

L2*: no 100% test possible, as the test specimens are destroyed during the test.
Proof of capability or continuous testing of all special features must be coordinated directly with the OEM.

1.2.2 Customer: BMW

Customer: BMW BMW – Part number: 5A38147 – ZI B	NAEL:	E 2633 0 E 3H74 0 E 0N06 A E 2X59 A E LL48 B N OU53 B	VS July 2020 VS November 2020 VS February 2021 VS March 2021 VS December 2021 VS October 2022

Special characteristics acc. to GS 91011: 2019-08					
L	**S**	**F**	**Characteristic**	**Specific purpose**	**Place of implementation**
L1	-	-	Wire shield pressing	Shield contact – EMC and pull-off force	Manufacturer
-	-	F1	Press-in dimension	Pluggability	
L2*	-	-	Shielding pull-off force	Shield contact – EMC and pull-off force	

L2*: no 100% test possible, as the test specimens are destroyed during the test.
Proof of capability or continuous testing of all special features must be coordinated directly with BMW.

Legend: L = Legal, S = Safety, F = Function

1.3 Other current documents

A	HCT4 process specification (Ag)	EVS-100068
B	Datasheet Kroschu 4x 6.0 mm² sheathed cable	Kroschu No.: 64997545
C	Datasheet Kroschu 3x 6.0 mm² sheathed cable	Kroschu No.: 64997544
D	Datasheet Kroschu 2x 6.0 mm² sheathed cable	Kroschu No.: 64997213
E	Datasheet Kroschu 4x 4.0 mm² sheathed cable	Kroschu No.: 64996822
F	Datasheet Kroschu 3x 4.0 mm² sheathed cable	Kroschu No.: 64996977
G	Datasheet Kroschu 2x 4.0 mm² sheathed cable	Kroschu No.: 64997293
H	Datasheet Coroflex 4x 6.0 mm² sheathed cable	Coroflex No.: 9-2641 (4x 6.0 mm²)
I	Datasheet Coroflex 3x 6.0 mm² sheathed cable	Coroflex No.: 9-2641 (3x 6.0 mm²)
J	Datasheet Coroflex 2x 6.0 mm² sheathed cable	Coroflex No. 9-2641 (2x 6.0 mm²)
K	Datasheet Coroflex 4x 4.0 mm² sheathed cable	Coroflex No.: 9-2641 (4x 4.0 mm²)
L	Datasheet Coroflex 3x 4.0 mm² sheathed cable	Coroflex No.: 9-2641 (3x 4.0 mm²)
M	Datasheet Coroflex 2x 4.0 mm² sheathed cable	Coroflex No.: 9-2641 (2x 4.0 mm²)
N	Datasheet Bizlink 4x 6.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00015
O	Datasheet Bizlink 3x 6.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00018
P	Datasheet Bizlink 2x 6.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00003
Q	Datasheet Bizlink 4x 4.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00020
R	Datasheet Bizlink 3x 4.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00005
S	Datasheet Bizlink 2x 4.0 mm² sheathed cable	Bizlink No.: FHLR2G2GCB2G / 00002
T	Datasheet GG 4x 6.0 mm² sheathed cable	GG No.: FHLR2G2GCB2G 4x 6.0 mm²/ T180
U	Datasheet GG 2x 6.0 mm² sheathed cable	GG No.: FHLR2G2GCB2G 2x 6.0 mm²/ T180
V	Datasheet GG 2x 6.0 mm² sheathed cable	GG No.: FLR31YBC11Y 2x 6.0 mm² /T125
W	Datasheet Coficab 4x 6.0 mm² sheathed cable	Coficab No.: LGCBG460xxxxx
X	Datasheet Coficab 3x 6.0 mm² sheathed cable	Coficab No.: LGCBG360xxxxx
Y	Datasheet Coficab 2x 6.0 mm² sheathed cable	Coficab No.: LGCBG260xxxxx
Z	Datasheet Coficab 4x 4.0 mm² sheathed cable	Coficab No.: LGCBG440xxxxx

AA	Datasheet Coficab 3x 4.0 mm² sheathed cable	Coficab No.: LGCBG340xxxxx
AB	Datasheet Coficab 2x 4.0 mm² sheathed cable	Coficab No.: LGCBG240xxxxx
AC	Datasheet NBKBE 2x 6.0 mm² sheathed cable	NBKBE No.: FHLR2G2GCB2G 2x 6.0 mm²
AD	Datasheet 2x 6.0 mm² sheated cable from Coficab	Coficab No.: H3XXCBX260Hxx
AE	Datasheet 4x 4.0 mm² sheated cable from Coficab	Coficab No.: H3XXCBX440Hxx
AF	Datasheet 4x 6.0 mm² sheated cable from Coficab	Coficab No.: H3XXCBX460Hxx
AG	Datasheet 4x 6.0 mm² sheated cable from Acome	Acome No.: T1296
AH	Datasheet 4x 6.0 mm² sheated cable from Coficab	Coficab No.: H14GGCX460Hxx

2 Product structure (single components)

2.1 Sheated cable (see table)

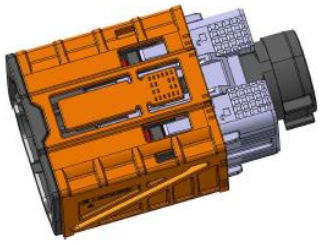
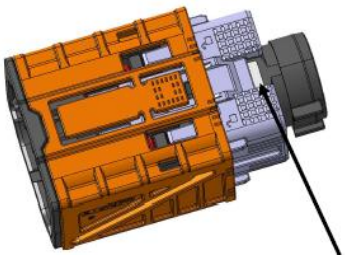
Wire manufacturer	Wire cross section		
	4x 6.0 mm² Ø14,5-15,1	**4x 4.0 mm²** Ø12,7-13,3	**3x 6.0 mm²** Ø13,5-14,1
Kroschu	FHLR2G2GCB2G Supplier production plant: Deutschland, 42279 Wuppertal		
	64997545	64996822	64997544
Coroflex	FHLR2GCB2G Supplier production plant: Deutschland, 42279 Wuppertal		
	9-2641 4x 6.0 mm²	9-2641 4x 4.0 mm²	9-2641 3x 6.0 mm²
Bizlink	FHLR2G2GCB2G Supplier production plant: Italien, 29010 Monticelli		
	00015	00020	00018
Gebauer & Griller	FHLR2G2GCB2G Supplier production plant: Österreich, 2170 Poysdorf		
	FHLR2GCB2G 4x 6.0 mm² /T180	-	-
Coficab	FHLR91X91XCB91X T3 Supplier production plant: Portugal		
	H3XXCBX 460Hxx	H3XXCBX 440Hxx	-
	FHLR2G2GCB2G Supplier production plant: Portugal, 6300 Guarda		
	LGCBG460 xxxxx	LGCBG440 xxxxx	LGCBG360 Xxxxx
	FHLR2G2GC91X T4[2] Supplier production plant: Portugal		
	FHLR2G2GC91X T4 [2] H4GGCX460Hxx	-	-
Acome	FHLR2X91YCB91X[3] Supplier production plant: France/China		
	FHLR2X91YCB91X [3] 4x6-B T150 - T1296	-	-

[3]Only in combination with wire seal 710-245-503 (3x 6.0 mm²); max. temperature of 120°C.
[2]Only in combination with wire seal 710-245-503 (3x 6.0 mm²).
Only wires which are listed here and released by the respective OEM are allowed to use.

Wire manufacturer	Wire cross section			
	3x 4.0 mm² Ø11,5-12,1	**2x 6.0 mm²** Ø12,2-12,8	**2x 6.0 mm²** Ø11,1-11,7	**2x 4.0 mm²** Ø10,7-11,3
NBKBE	FHLR2G2GCB2G Supplier production plant: China			
	-	2x 6.0 mm²	-	-
Kroschu	FHLR2G2GCB2G Supplier production plant: Deutschland, 42279 Wuppertal			
	64996977	64997213	-	64997293
Coroflex	FHLR2GCB2G Supplier production plant: Deutschland, 42279 Wuppertal			
	9-2641 3x 4.0 mm²	9-2641 2x 6.0 mm²	-	9-2641 2x 4.0 mm²
Bizlink	FHLR2G2GCB2G Supplier production plant: Italien, 29010 Monticelli			
	00005	00003	-	00002
Gebauer & Griller	FHLR2G2GCB2G Supplier production plant: Österreich, 2170 Poysdorf			
	-	FHLR2G2GCB2G 2x 6.0 mm²/ T180	-	-
	FLR31YBC11Y Supplier production plant: Österreich, 2170 Poysdorf			
	-	-	FLR31YBC11Y 2x 6.0mm²/ T125	-
Coficab	FHLR91X91XCB91X T3 Supplier production plant: Portugal			
	-	H3XXCBX 260Hxx	-	-
	FHLR2G2GCB2G Supplier production plant: Portugal, 6300 Guarda			
	LGCBG340 xxxxx	LGCBG260 xxxxx	-	LGCBG240 xxxxx

Only wires which are listed here and released by the respective OEM are allowed to use.

2.2 HPS40 4+2 locking sleeve

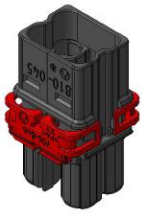
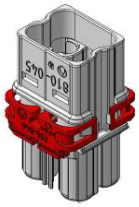
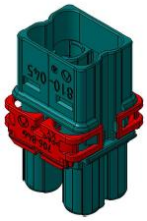
	
-502 (without DMC or laser marking)	-501/-503/-504 (with DMC or laser marking)

Hirschmann Automotive No.	Wire cross section	OEM
810-044-501	4x 6.0 mm² 4x 4.0 mm² 3x 6.0 mm² 3x 4.0 mm² 2x 6.0 mm² 2x 6.0 mm² 2x 4.0 mm²	BMW
810-044-502		Mercedes-Benz
810-044-503		Volvo
810-044-504		Neutral

Information: Different DMC/ logo laser marking on the locking sleeve, depending on the OEM/ customer.

Delivery condition: The locking sleeves are delivered in a blister.

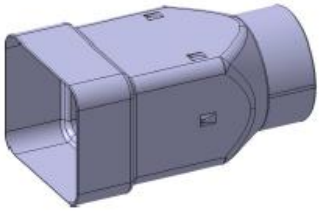
2.3 HPS40 4+2 female contact carrier

		
Cod. A	Cod. B	Cod. Z

Hirschmann Automotive No.	Coding	Colour	HVIL bridge
810-045-501	A	Black	No
810-045-502	B	Nature / White	No
810-045-505	Z	Waterblue	No
810-045-511	A	Black	Yes
810-045-512	B	Nature / White	Yes
810-045-515	Z	Waterblue	Yes

Delivery condition: The female contact carriers are delivered as bulk good.

2.4 HPS40 4+2 shielding sleeve

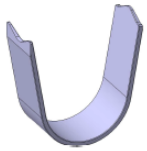
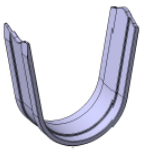
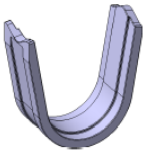


-511

Hirschmann Automotive No.	Wire cross section
710-237-511	4x 6.0 mm² 4x 4.0 mm² 3x 6.0 mm² 3x 4.0 mm² 2x 6.0 mm² 2x 4.0 mm²

Delivery condition: The shielding sleeves are delivered as bulk good.

2.5 HPS40 4+2 ferrule crimp/ strain relief

		
710-387-…		
-511	-501	-502

See details on table 2.5 HPS40 4+2 Mantelcrimp

			
710-455-…			
-501	-502	-503	-512

Hirschmann Automotive No.	Wire cross section
710-455-501	3x 4.0mm² Ø11,5-12,1
710-455-502	2x 6,0 mm² Ø12,2-12,8
710-455-503	2x 4,0 mm² Ø10,7-11,3
710-455-512	2x 6.0 mm² Ø11,1-11,7

Wire manufacturer: On the product drawing (Hirschmann Automotive no. 809-981-…XX), you can find the released cables for each ferrule crimp / strain relief.

Delivery condition: The ferrule crimps / strain reliefs are delivered as bulk good.

Tabelle 2.1 Overview wire to HPS40 4+2 ferrule crimp

Wire manufacturer	Wire type	Listed in chapter	Wire cross section	Hirschmann Automotive No.
Kroschu	FHLR2G2GCB2G	B	4x 6,0 mm² / Ø14,5-15,1	710-387-511
Coroflex	FHLR2G2GCB2G	H		
Bizlink	FHLR2G2GCB2G	N		
Coficab	FHLR91X91XCB91X T3	AF		
Coficab	FHLR2G2GCB2G	W		
Kroschu	FHLR2G2GCB2G	E	4x 4,0 mm² / Ø12,7-13,3	710-387-502
Coroflex	FHLR2G2GCB2G	K		
Bizlink	FHLR2G2GCB2G	Q		
Coficab	FHLR91X91XCB91X T3	AE		
Coficab	FHLR2G2GCB2G	Z		
Kroschu	FHLR2G2GCB2G	C	3x 6,0 mm² / Ø13,5-14,1	710-387-501
Coroflex	FHLR2G2GCB2G	I		
Bizlink	FHLR2G2GCB2G	O		
Coficab	FHLR2G2GCB2G	X		
NBKBE	FHLR2G2GCB2G	t.b.d.		
Gebauer & Griller	FHLR2G2GCB2G	T	4x 6,0 mm² / Ø14,5-15,1	710-387-501
Coficab	FHLR2G2GC91X T4	AH		
Acome	FHLR2X91YCB91X	AG		

2.6 HPS40 4+2 wire seal

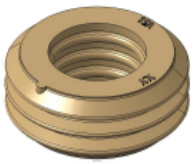
			
-501	-502	-503	
			
-504	-505	-506	-515

Tabelle 2.2 Overview HPS40 4+2 wire seal article no.

Hirschmann Automotive No.	Colour	Wire cross section
710-245-501	Purple	4x 6.0 mm² Ø14,5-15,1
710-245-502	Blue	4x 4.0 mm² Ø12,7-13,3
710-245-503	Green	3x 6.0 mm² Ø13,5-14,1
710-245-504	Rose	3x 4.0 mm² Ø11,5-12,1
710-245-505	Red	2x 6.0 mm² Ø12,2-12,8
710-245-506	Grey	2x 4.0 mm² Ø10,7-11,3
710-245-515	Beige	2x 6.0 mm² Ø11,1-11,7

Tabelle 2.3 Overview HPS40 4+2 wire seal (1) only for defined article no.

Wire manufacturer	Wire type	Listed in chapter	Wire cross section	Hirschmann Automotive no.
Coficab	FHLR2G2GC91X T4	AH	4x 6,0 mm² / Ø14,5-15,1	710-245-503
Acome	FHLR2X91YCB91X	AG		

Wire manufacturer: On the product drawing (Hirschmann Automotive no. 809-981-…XX), you can find the released cables for each wire seal.

Delivery condition: The wire seals are delivered as bulk good.

2.7 HPS40 4+2 cover cap

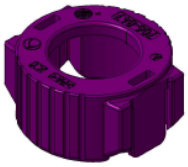
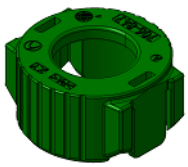
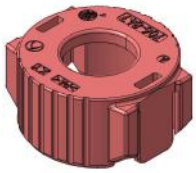
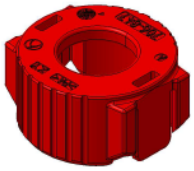
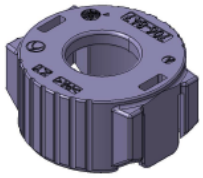
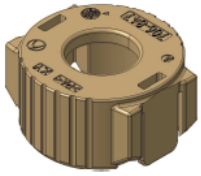
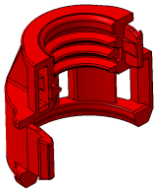
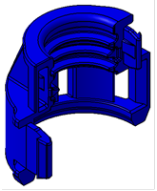
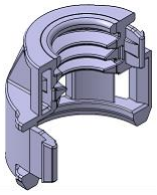
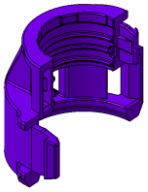
			
-501	-502	-503	
			
-504	-505	-506	-515
			
707-780-…			
-506	-507	-508	-509

Tabelle 2.4 Overview HPS40 4+2 cover cap article no.

Hirschmann Automotive No.	Colour	Wire cross section
706-847-501	Purple	4x 6.0 mm² Ø14,5-15,1
706-847-502	Blue	4x 4.0mm² Ø12,7-13,3
706-847-503	Green	3x 6.0 mm² Ø13,5-14,1
706-847-504	Rose	3x 4.0 mm² Ø11,5-12,1
706-847-505	Red	2x 6.0 mm² Ø12,2-12,8
706-847-506	Grey	2x 4.0 mm² Ø10,7-11,3
706-847-515	Beige	2x 6.0 mm² Ø11,1-11,7

Tabelle 2.5 Overview HPS40 4+2 cover cap only for defined article no.

Wire manufacturer	Wire type	Listed in chapter	Wire cross section	Hirschmann Automotive no.
Coficab	FHLR2G2GC91X T3	AH	4x 6,0 mm² / Ø14,5-15,1	707-780-509
Coficab	FHLR2G2GC91X T3	AE	4x 4,0 mm² / Ø12,7-13,3	707-780-507
			2x 4,0 mm² / Ø10,7-11,3	707-780-508
Coficab	FHLR2G2GC91X T3	AD	2x 6,0 mm² / Ø12,2-12,8	707-780-506

Wire manufacturer: On the product drawing (Hirschmann Automotive no. 809-981-…XX), you can find the released cables for each cover cap.

Delivery condition: The cover caps are delivered as bulk good.

2.8 HCT4 female terminal

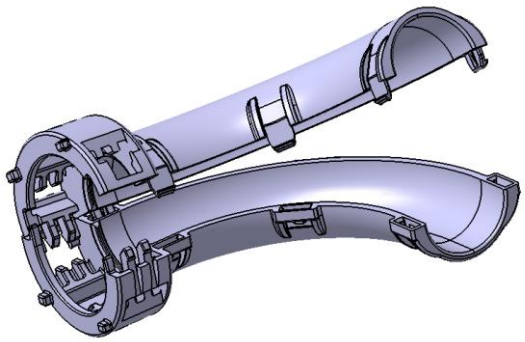
	
-504	-505

Hirschmann Automotive No.	Wire cross section
709-427-504	4x 4.0 mm² 3x 4.0 mm² 2x 4.0 mm²
709-427-505	4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²

Delivery condition: The female terminals are delivered on a terminal strip on a spool.

3 Product structure (optional parts)

3.1 HPS40-2 2+2 90° angle cap



Hirschmann Automotive No.	Wire cross section
706-990-501	4x 4.0 mm² 3x 4.0 mm² 2x 4.0 mm² 4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²

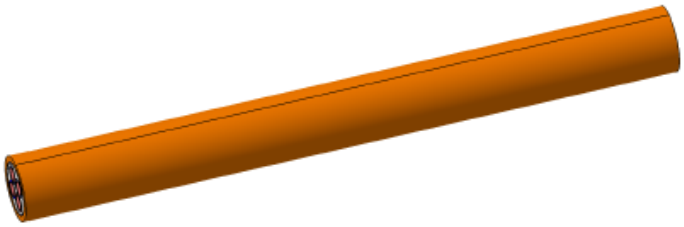
Information: The 90° angled cap can be used as an optional part instead of the cover cap.

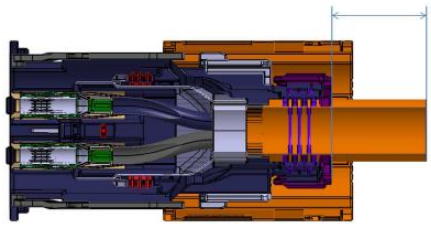
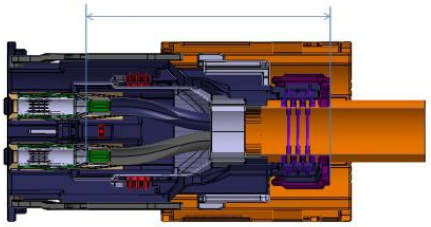
Delivery condition: The 90° angled caps are delivered as bulk good.

4 Processing steps

Use the following described processing steps as necessary for the wire cross sections 4x 4.0 mm²/ 3x 4.0 mm²/ 2x 4.0 mm² and 4x 6.0 mm²/ 3x 6,0 mm²/ 2x 6.0 mm². As a reference sample, a female contact carrier coding A and a 4x 6.0 mm² wire was used.

4.1 Cut the shielded cable



L	+ wire add-on
	

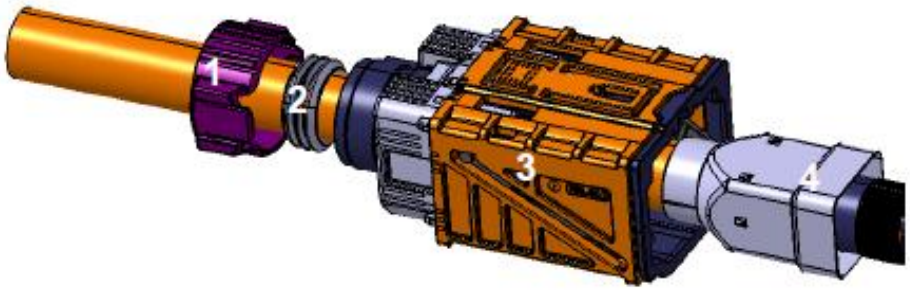
Add the following lengths for the Hirschmann Automotive HPS40 4+2 female connector:

Wire cross section	Wire add-on without zero-cut (mm)	Wire add-on with zero-cut (mm)
4x 6.0 mm²	60.0	64.0
4x 4.0 mm²		
3x 6.0 mm²		
3x 4.0 mm²		
2x 6.0 mm²		
2x 4.0 mm²		

This dimension must be added to the planned length (L) at cutting process of the wire for each female connector.

4.2 Assembly of the single components

Slide the cover cap (1), the wire seal (2), the locking sleeve (3) and the shielding sleeve (4) onto the shielded cable.

1	2	3	4
			

4.3 Strip off the shielded cable

Stripping length:

Wire cross section	When crimping of the HCT4 female terminals by triggering via the single wires		When crimping of the HCT4 female terminals by triggering via the shielding braids
	L1 excl. zero-cut (mm)	L1 incl. zero-cut (mm)	L1
4x 6.0 mm² 4x 4.0 mm² 3x 6.0 mm²	30.0 ± 0.8	34.0 ± 0.8**	min. 34.0
3x 4.0 mm² 2x 6.0 mm² 2x 4.0 mm²	31.0 ± 1.0	35.0 ± 1.0	min. 35.0

**An adjustment of the stripping length to 34.5 ± 0.8 is allowed, under the premise that this is considered at positioning the ferrule crimp.

Do not damage the shielding during the processing operation.

4.4 Wire processing I

Assemble ferrule crimp/ strain relief and crimp. If necessary, remove foil and shorten shielding.

4.4.1 Version 1 – ferrule crimp/ crimping

(4x 6.0 mm²/ 4x 4.0 mm²/ 3x 6.0 mm²)

- **Ferrule crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company Schaefer can be used:

Name of the device:	HPS40-4+2WAY Ferrule crimping machine
Article number:	EPS3000-HPS40-4-ZE

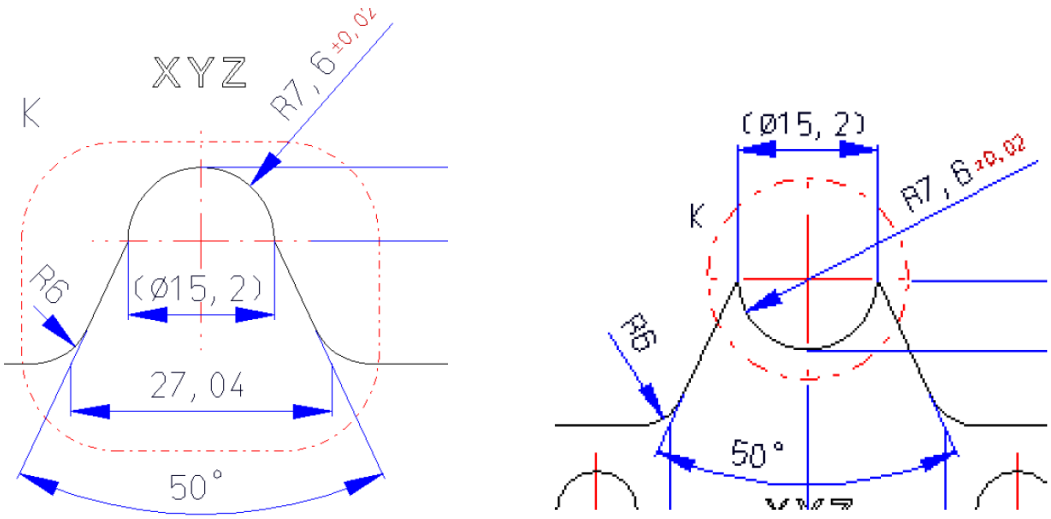
The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schönborn-La, Germany
Tel.: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the crimping device must be done through the manufacturer. In this edition you can only find the information of the crimping and positioning of the crimping process.

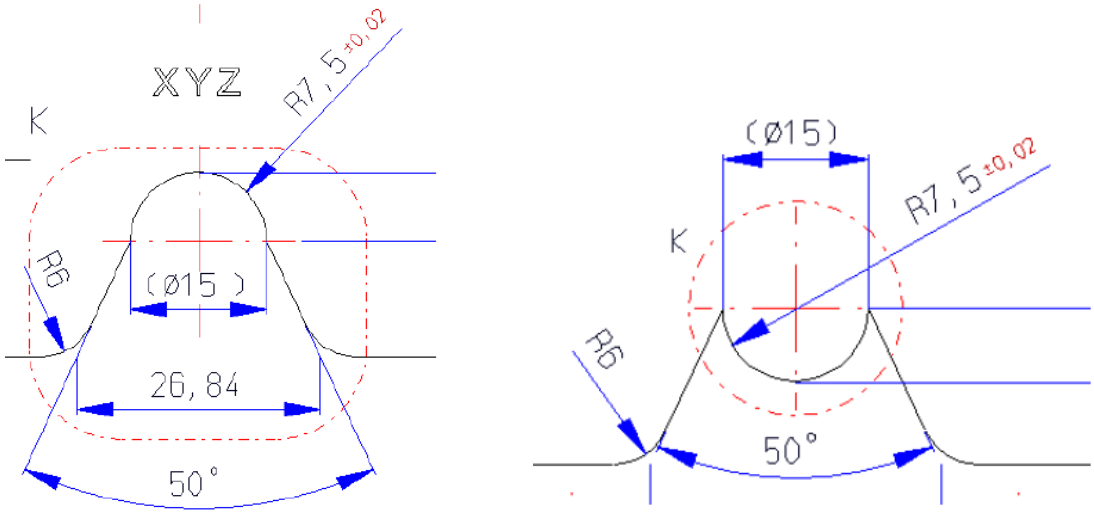
- **Plunger and anvil geometry for ferrule crimping**

The following stamp geometry is valid for:
Wire cross section 4x 6.0 mm² (1)
Wire cross section 4x 4.0 mm², ferrule crimp 710-387-502

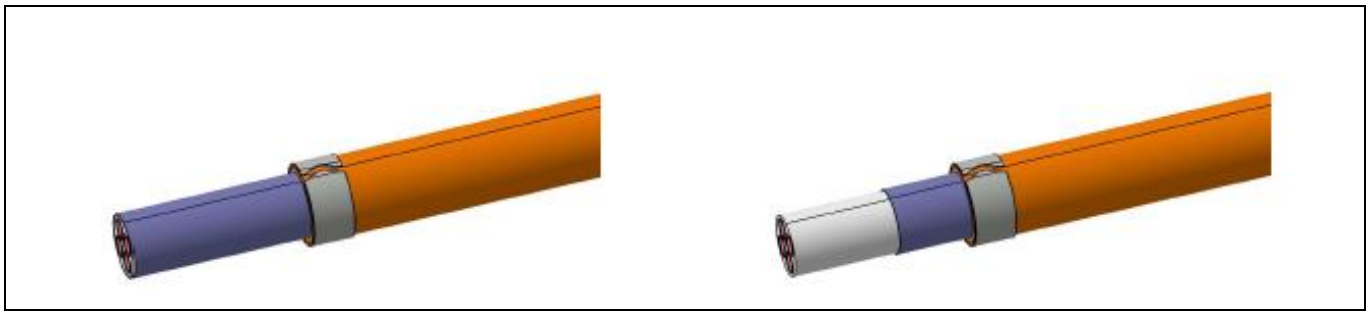


(1) Tob e used for Gebauer and Griller (chapter T)

The following stamp geometry is valid for:
Wire cross section 4x 6.0 mm², ferrule crimp 710-387-511
Wire cross section 3x.6.0 mm², ferrule crimp 710-387-501

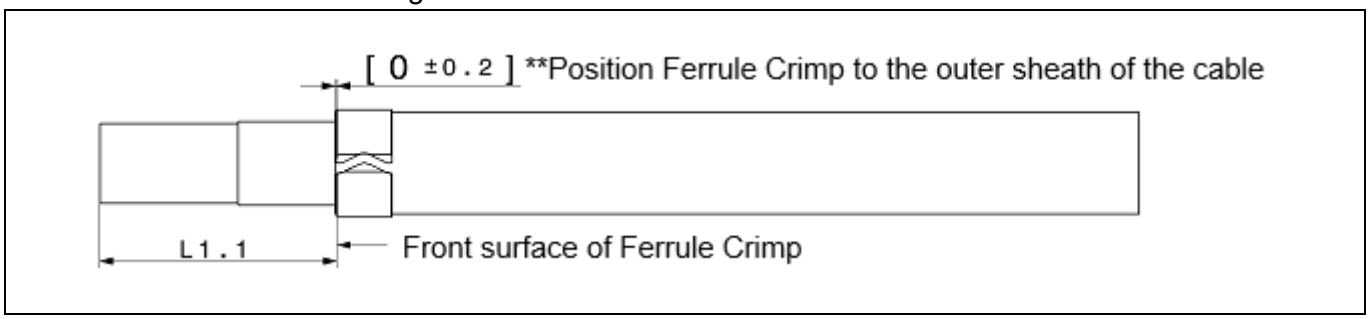


(2) Tob e used for Acome (chapter AG), Coficab (chapter AH) and Cofica (chapter AF)



The following process steps must be done, but the processor can choose the sequence.

- Assemble the ferrule crimp and crimp onto the cable.
  Note: In this working step, no zero-cut is performed, for this reason the required tolerances must already be adhered to when stripping the cables.
- Remove the foil.
- Shorten the shielding.



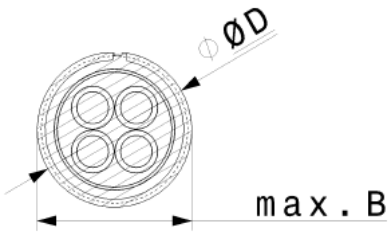
An adjustment of the tolerance for positioning the outer crimp to [0 + 0.2 / – 0.5] is permissible, provided that the stripping length is adjusted accordingly.
For Acome (Chapter AG), a dimension of 0 + 0 / – 1.5 is permissible.

The outer crimp must be positioned in relation to the cable's outer sheath. The dimension [0 ± 0.2] should be maintained. During the crimping process, the insulation may be pushed forward, which can cause the position dimension to deviate. To verify the dimension, dimension L1.1 should be used.

Also, for this the measurement of L1.1 should be used as a check.

L1.1 = 30.0 ± 1.0 excl. zero-cut allowance
= 34.0 ± 1.0 incl. zero-cut allowance

- **Ferrule crimp pressing dimension**

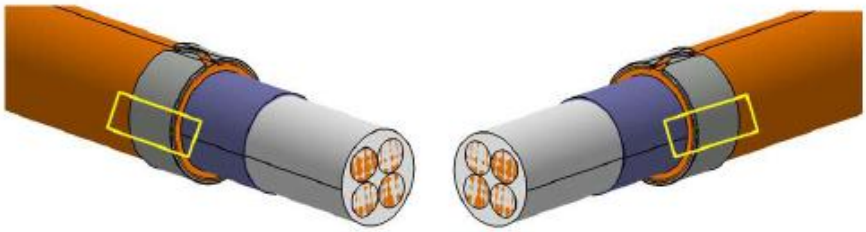
	When pressing the Ferrule crimp, the dimension is ØD. Because of the tool separation between the stamp and the anvil a slight ovality may result in the crimp width. In the crimp width, the dimension is up to max. B permitted.

Wire manufacturer	Wire cross section		
	4x 6.0 mm²	4x 4.0 mm²	3x 6.0 mm²
Kroschu (FHLR2G2GCB2G)	ØD = 15.6 ± 0.15 max. B = 15.8	ØD = 15.6 ± 0.15 max. B = 15.8	ØD = 15.6 ± 0.15 max. B = 15.8
Bizlink (FHLR2G2GCB2G)			ØD = 15.5 + 0.15/-0.3 max. B = 15.7
Coroflex (FHLR2GCB2G)			ØD = 15.6 ± 0.15 max. B = 15.8
GG (FHLR2G2GCB2G)		-	-
Coficab (FHLR2G2GCB2G)		ØD = 15.6 ± 0.15 max. B = 15.8	ØD = 15.5 ± 0.15 max. B = 15.7
Coficab FHLR91X91XCB91X T3	ØD = 15.6 ± 0.15 max. B = 15.8	ØD = 15.6 ± 0.15 max. B = 15.8	-
Coficab (FHLR2G2GC91X T4)	ØD = 15.6 ± 0.15 max. B = 15.8	-	-
Acome (FHLR2X91YCB91X)	ØD = 15.6 ± 0.15 max. B = 15.8	-	-

For cables with a wire cross section of 4x 6.0 mm² the following deviation is permitted:

An increase of the crimping dimension ØD and a crimping with of max. B mm is permitted up to a diameter of max. Ø16.06mm, provided that the following processing steps up to, pressing shielding sleeve, are still feasible acc. to the specification, and that no damages occur on the cable. The quality of the backwards folded shield in the processing, done by the manufacturer, is relevant for the resulting assembling force of the shielding sleeve.

When the ferrule crimp is crimped, slight scratches may occur in the tool separation, but they are permitted.



Slight scratches in this area are permitted.

Possible Burr Formation
During the crimping process of the outer crimp, slight burr formation may occur on the open side of the crimp. During the closing process, when the crimp flanks are brought together, local material abrasion on the cable sheath may occur.

Requirement:

- Abraded material that is loose must be removed (e.g., during cleaning or by appropriate rework steps).
- Abraded material that adheres firmly and is completely enclosed when the shield is folded over, so that it cannot come loose during further processing or operation, is acceptable.
  It must be ensured that no insulation residues remain that could come loose and enter areas critical to function or sealing.

4.4.2 Version 2 – strain relief / no crimping

(3x 4.0 mm²/ 2x 6.0 mm²/ 2x 4.0 mm²)

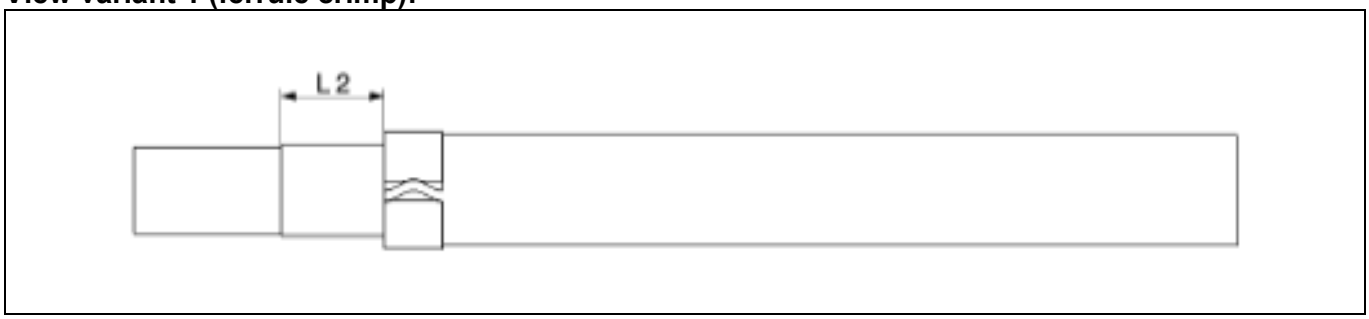
The following process steps must be done, but the processor can choose the sequence.

- Assemble the strain relief onto the shielded cable.
- Remove the foil.
- Shorten the shielding.

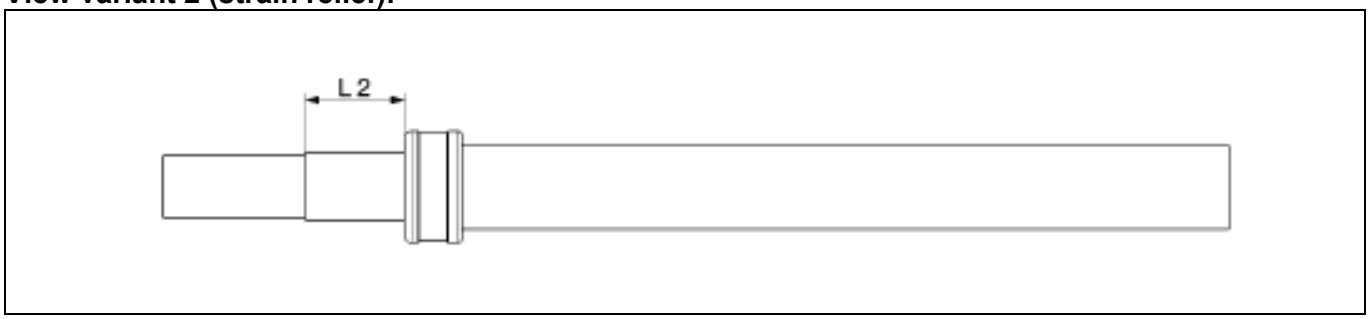
An overlap of the foil in the area of the ferrule crimp/ strain relief is allowed circulating up to max. 1.5 mm. An overlap of the foil in the area of the ferrule crimp/ strain relief, like small edges is allowed up to max. 4.0 mm.

- **Dimension of the shielding**

View variant 1 (ferrule crimp):



View variant 2 (strain relief):



Depending on the production method of each manufacturer, the dimension L2 can vary.

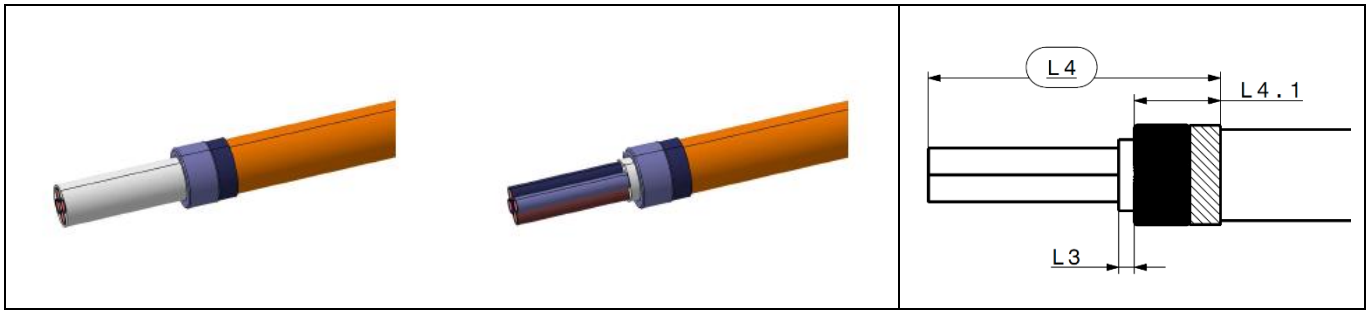
After cutting the shielding there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:

- Can be avoided by removing the residues of the shielding.
- Can be avoided by blowing or by suction of the residues of the shielding.

Furthermore, it must be ensured that the shielding is rising over the ferrule crimp / strain relief at 100% in the next process step.

4.5 Wire processing II

Fold the shield backwards, fix the shield by tape and remove the filling.



100% of the shield must be folded down at the back over the strain relief. Specific unbraiding of the shield is not permitted. Folding the screen may, however, result in minor process-related unbraiding, which is permissible. Precise processing of the shield is crucial for product quality. To ensure this process step, the values specified in chapter 4.10. 'Pull-off force of the sheathed cable' can be used as a functional characteristic. After this the shield must be fixed with a fixing device after the strain relief (for example: tape).

- The fixing tape needs to stay on, until the pressing procedure is done and can be left inside the connector. The max. width of the tape is **5.0 mm**.
- The fixing tape must be positioned immediately after the ferrule crimp / strain relief and must not reach the ferrule crimp / strain relief.
- No shielding allowed outside the fixing tape.

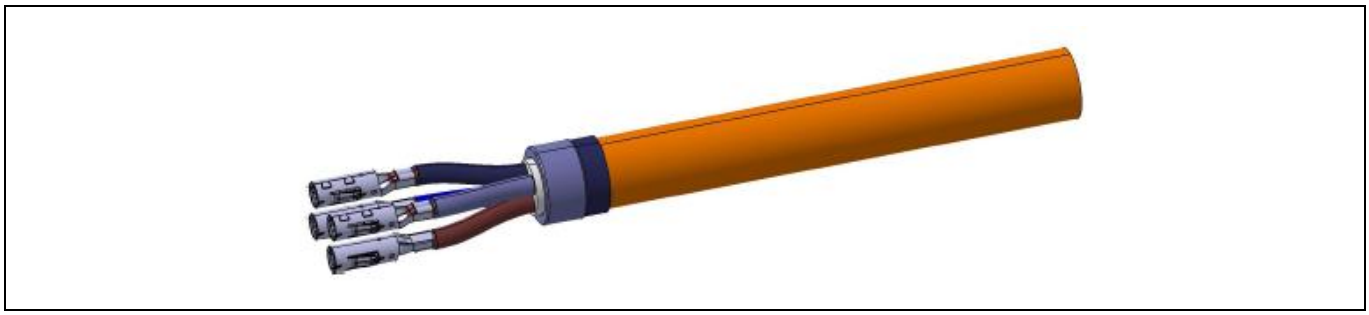
The max. position of the tape is showed with the dimension L4.
L4 = max. 45.4 mm after zero-cut
= max. 49.4 mm incl. zero-cut

The dimension L4.1 is only necessary if the crimping of the HCT4 female terminals is made by triggering via the shielding braids.
L4.1 = max. 14.2 mm

To check the L4 and L4.1 dimension it is not necessary to measure both dimensions. For this, the manufacturer is free to choose whether dimension L4 or L4.1 is measured. In this specification the PET-fabric tape 837X (838X) **5.0 mm** of the company Coroflex is used. It is possible to use another product to fix the shield. The max. outer diameter after assembling is Ø 16.6 mm and the shielding sleeve must be able to be mounted easily.
The product must have min. 150° C thermal resistance.

- The projection of the filling material can protrude max. 3.0 mm towards the outer sheath.
  In the area between the two single cores the filling material is allowed to be bigger than L3.
- Single strands of the shield, which are not fixed with the tape and stick out must be removed before further process steps.
- Do not damage the single wires during the complete processing operation.

4.6 Crimp the HCT4 female terminal



4.6.1 Version 1 - crimping of the HCT4 female terminals

By triggering via the single wires!

- **Double stroke crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company Schaefer can be used.

Name of the device:	HPS40-4+2WAY Double stroke crimping machine
Article number:	EPS2001-HPS40-4-HCT4
Name of the device:	Interchangeable crimping unit
Article number:	Shown in the process specification HCT4 female terminal “EVS-100068”

The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier.

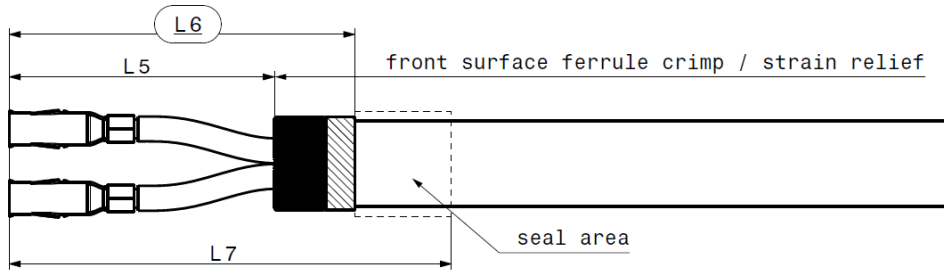
Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schönborn-La, Germany
Tel.: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the crimping device must be done by the manufacturer. Therefore, you can only find the information of the crimping and positioning of the crimping process, in this edition.

- **Process data**

  a) The crimp data can be seen in the “Process specification HCT4 female terminal EVS-100068”.
  b) The HCT4 female terminals need to be crimped in relation to the single wires. For a smooth assembly into the contact carrier, the HCT4 female terminals need to be crimped in the correct position.

The dimensions on the following drawing need to be adhered to.



L5 = 46.50 ± 1.0
L6 = max. 62.05
L7 = max. 72.50

The dimensions L5 and L6 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068. To check the L5 and L5.1 dimensions it is not necessary to measure both dimensions. For this, the manufacturer is free to choose whether dimension L5 or L5.1 is measured.

The difference of the length between the HCT4 female terminals of max. 0.5 mm is allowed.

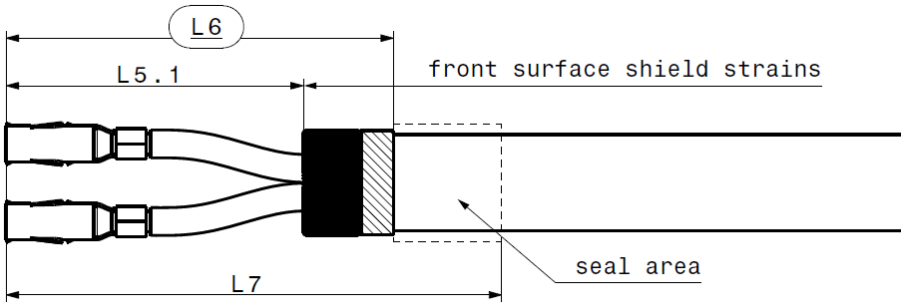
4.6.2 Version 2 - Crimping of the HCT4 female terminals

By triggering via the shielding braids!

- **Process data**

  a) The crimp data can be seen in the “Process specification HCT4 female terminal EVS-100068”.
  b) The HCT4 female terminals need to be crimped in relation to the single wires. For a smooth assembly into the contact carrier, the HCT4 female terminals need to be crimped in the correct position

The dimensions on the following drawing need to be adhered to.

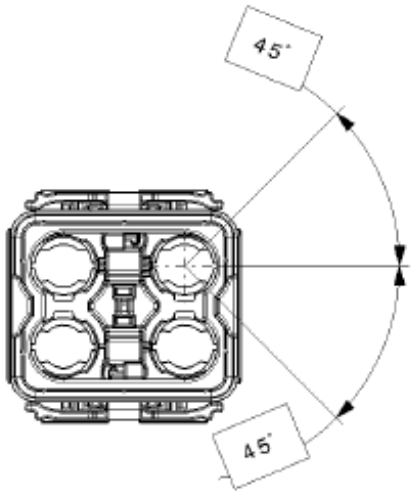
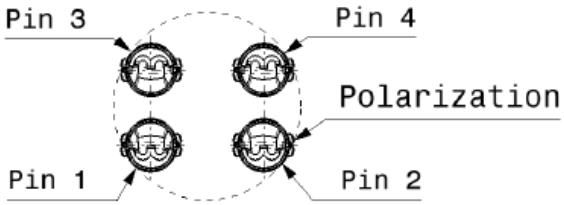


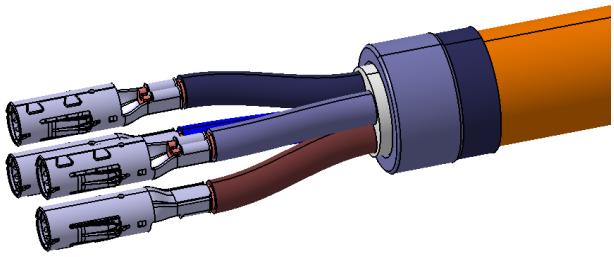
L5.1 = 46.10 ± 0.7
L6 = max. 62.05
L7 = max. 72.50

The dimension L6 is just for information. The dimensions are caused from the dimensions L5.1, L4.1 and the EVS-100068. To check the L5 and L5.1 dimensions it is not necessary to measure both dimensions. For this, the manufacturer is free to choose whether dimension L5 or L5.1 is measured.

The difference of the length between the HCT4 female terminals of max. 0.5 mm is allowed.

A mark on the insulation of the single wires or on the outer sheath, which is caused due to fixing the wire at the crimping process, is allowed. On the area of the wire seal, it is not allowed to deform or damage the outer sheath which has negative influence on the sealing function (see L7). It must be ensured that the insulation will not be damaged, this will lead to an insulation resistance failure.

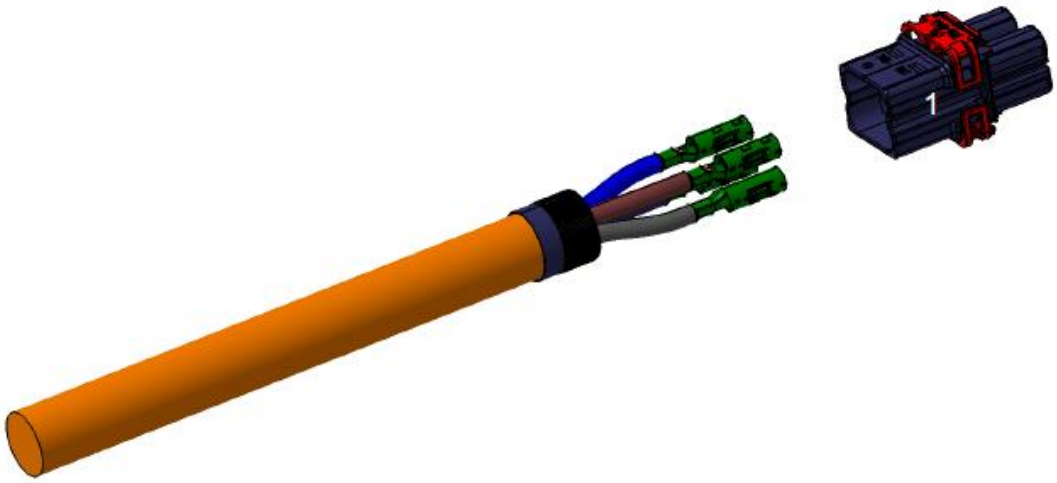
Angled insert catches HPS40 4+2 female contact carrier	Nominal position of the HCT4 female terminals to the cable
	



To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the HCT4 female terminals and the wire is very important and need to be ensured. Usually, the horizontal version is intended.

The allowed angle deviation results from the geometry of the angled insert catches on the contact carrier and the max. assembling force of the cable with the HCT4 female terminals into the contact carrier. This can be checked during the assembling process.

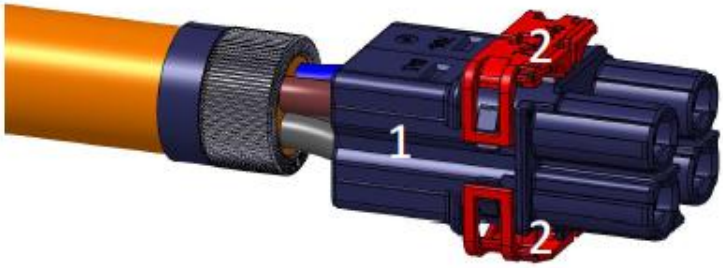
4.7 Assembly I

Assemble HCT4 female terminals into the contact carrier (1).


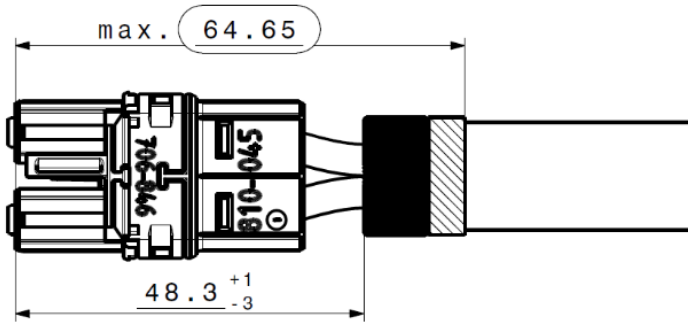
While assembling the HCT4 female terminals, the latching lance of the HCT4 female terminals will be deflected. Once the end position is reached, the latching lance will audibly engage, and the HCT4 female terminals will be primary locked (The HCT4 female terminals must be crimped).

The mounting force of the HCT4 female terminals into the contact carrier must be proven if the crimping machine of the company Schaefer is not used or if the HCT4 female terminals are not mounted fully automated inside the contact carrier.

Wire cross section	4x 6.0 mm²	4x 4.0 mm²	3x 6.0 mm²	3x 4.0 mm²	2x 6.0 mm²	2x 4.0 mm²
Assembly force	72N	60N	54N	45N	36N	30N

Secondary lock (2) pre-locking / HCT4 female terminals primary locked


The measurements on the following illustration are the result of processing steps with the measurements L5/ L5.1 & L6 previously shown. Depending on the manufacturer, different procedures of proof can be used for the dimensions. If the measurements L5/ L5.1 & L6 where already used as proof for adherence of the tolerance, the illustration shown below can be excluded. As an alternative to measurements, L5/ L5.1 and L6. A check can be performed by using the measurements 48.3 -3/+1 and max. 64.65.



During measuring the dimensions 48.3 -3/+1 & max. 64.65 the contact carrier and the wire must be positioned in a suitable mounting fixture to correct the deviation of position of the contact carrier and the wire, if necessary.

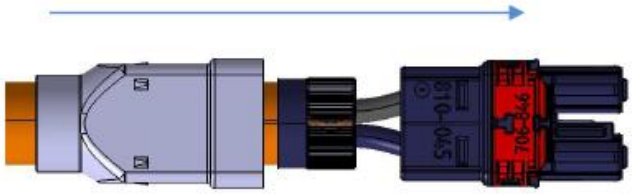
4.8 Assembly II

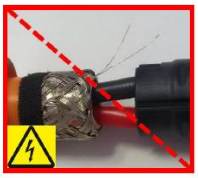
Assembly of the secondary lock (2)

The secondary locking can only be assembled if the HCT4 female terminals are in the end position. A visible difference of the HCT4 female terminals to each other can be possible in the contact cavity. Because of the position of the HCT4 female terminals on the wire, and the play of the HCT4 female terminals in the contact cavity it is possible and acceptable.

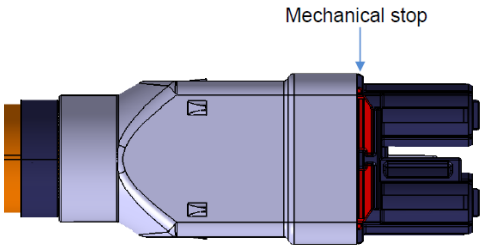
Secondary lock on end position


4.9 Push shielding sleeve onto contact carrier

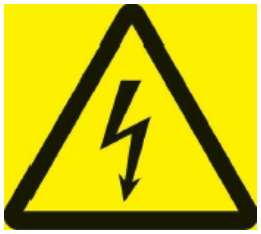




Reference picture of the process specification HPS40-2



- The shielding sleeve needs to be assembled onto the contact carrier in the correct position. It can only be turned by 180°.
- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve must be assembled until the end position is reached.
- The fixing tape must come out of the shielding sleeve completely after assembling.
- It must be ensured that no single strand of the shield stick out before the shielding sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework must be clarified with each OEM.



Risk of insulation failure!

4.10 Press shielding sleeve

- **Pressing device**

For the process of positioning and pressing of the stress relief and the shielding sleeve, the following pressing device of the company Schaefer can be used:

Name of the device:	HPS40-4+2WAY pressing machine shielding sleeve
Article number:	EPS3000-HPS40-4-SH

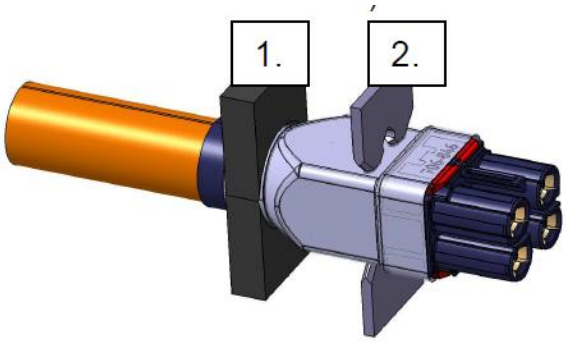
Based on the processing guidelines of Hirschmann Automotive GmbH, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier.

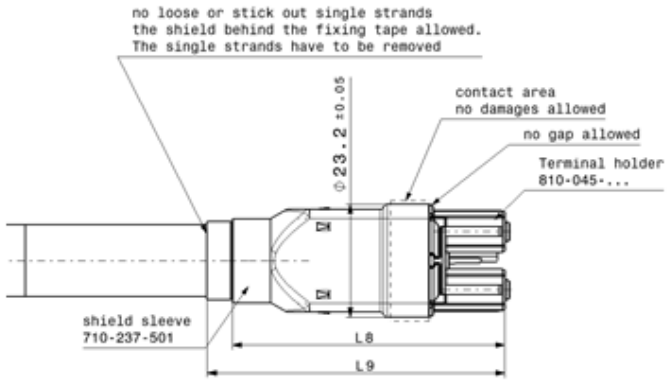
Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schönborn-La, Germany
Tel.: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the pressing device must be done through the manufacturer. It is at the harness makers discretion which devices/machines are going to be used. The pressing data and positioning data describe on the following pages must be ensured. In this edition you can only find the information of the pressing data of the pressing.

- **Crimping data**

  a) The contact carrier incl. the HCT4 female terminals must be put into the device in the correct position.
  b) Make sure, the shielding sleeve is on the end position of the contact carrier. The tape must stick out of the end of the shielding sleeve.
  c) The measurements on the following drawing, must be adhered to, before and after pressing.
  d) Two pressing actions will be done in one step.

	1.Shield Pressing (Shielding sleeve, shielding, ferrule crimp / stress relief and wire)
	2.Pressing of the contact carrier (shielding sleeve and contact carrier)

	L8 = 56.7 ± 0.3
	L9 = 64.6 ± 1.4

The dimension L8 and L9 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068.

Do not damage the following parts during the pressing process:

- Insulation of the wire
- Insulation of the single wires
- Ferrule crimp / strain relief
- Shielding sleeve
- Shield strands of the wire

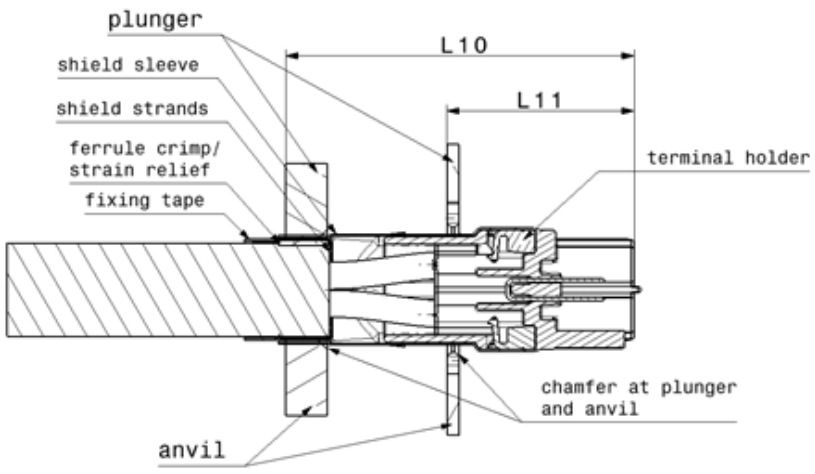
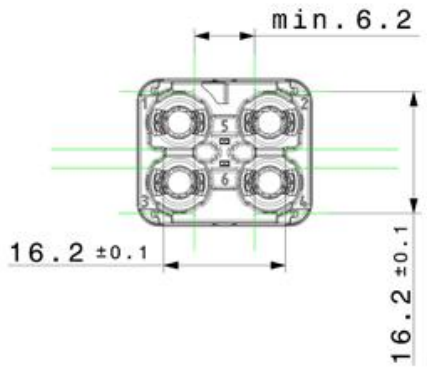
4.10.1 Shield pressing and contact carrier

Pressing via plunger/ anvil

- **Embossing position**

The exact geometries of the plunger and the anvil are given. The position of the plunger and the anvil must be revered to the front plane of the contact carrier. The chamfer at the plunger and the anvil must be on the side to the contact carrier. The green areas can be used as a jack for the contact carrier. Ensure that any coding version of the contact carrier can be inserted into the jack.

The dimension L10 and L11 is the position of the plunger and the anvil.

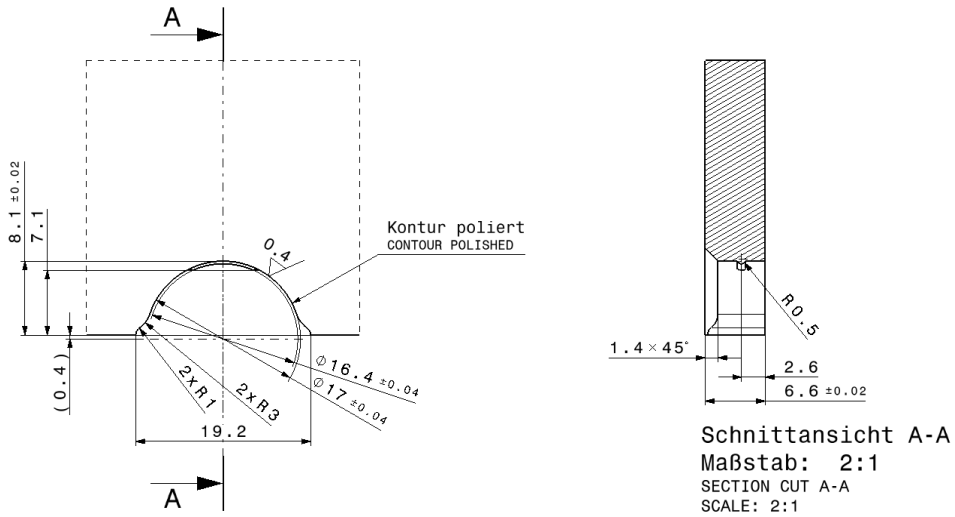
<table>
<tr>
<td rowspan="2"> 
</td>
<td>L10 = 55.45 ± 0.1
L11 = 29.80 ± 0.1</td>
</tr>
<tr>
<td> 
</td>
</tr>
</table>

- **Plunger and anvil geometry of the wire shield pressing**

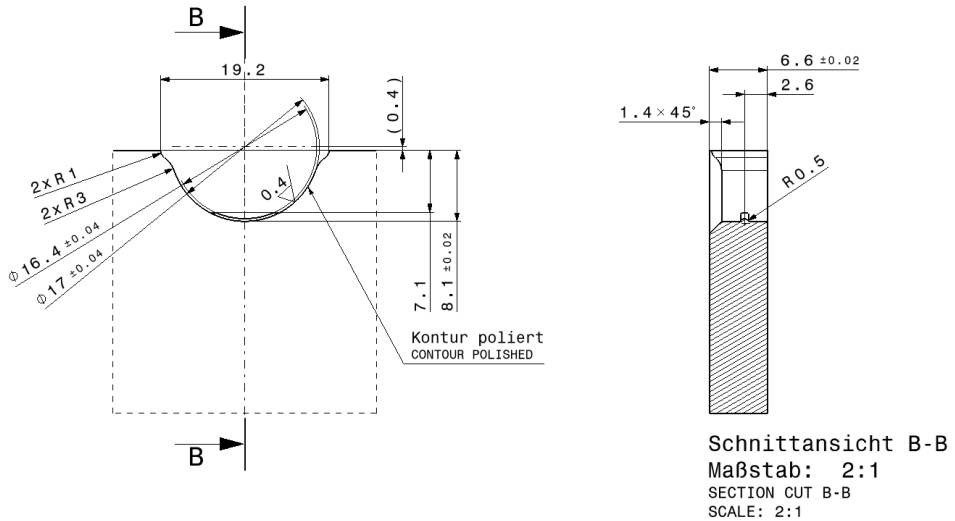
When processing, it must be ensured that the correct geometry is used for the cable shield crimping. The appropriate punch geometry for each line is given in the table below.

- **Plunger and anvil geometry 1:**

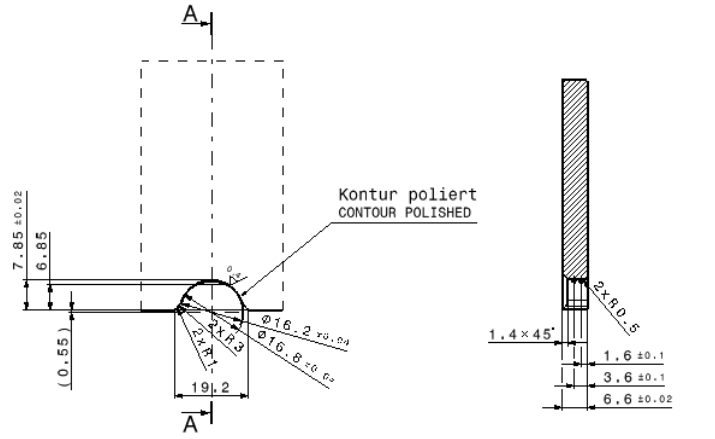
Plunger geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc

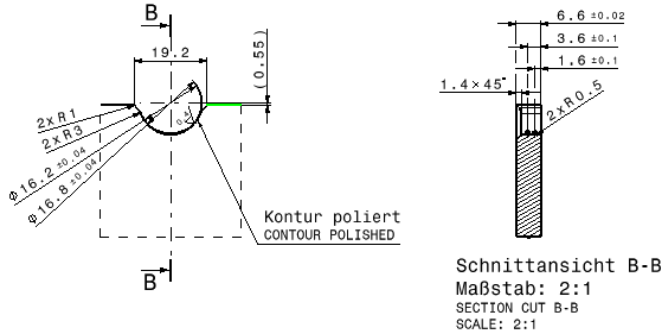


Anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc

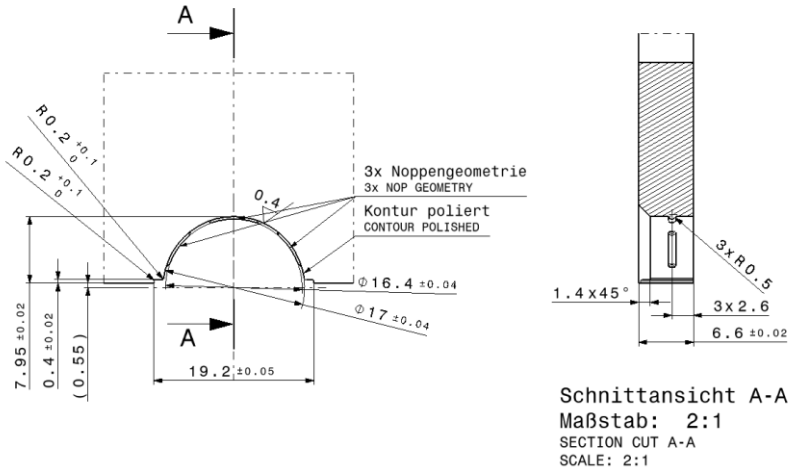


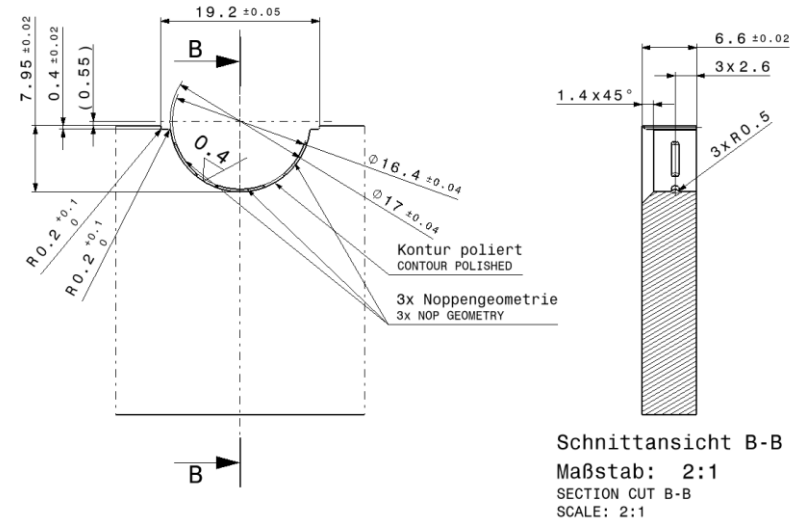
- **Plunger and anvil geometry 2:**

Plunger geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc
 1.

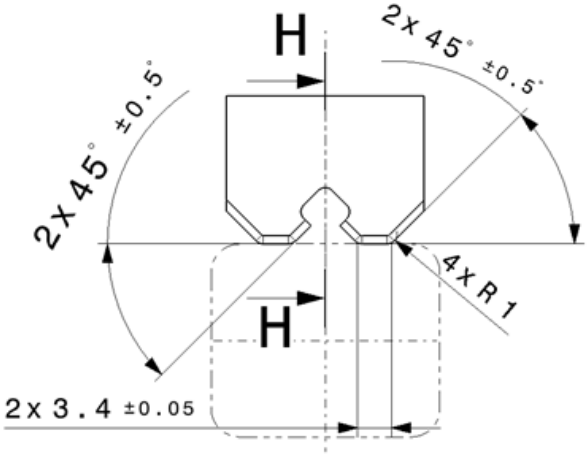
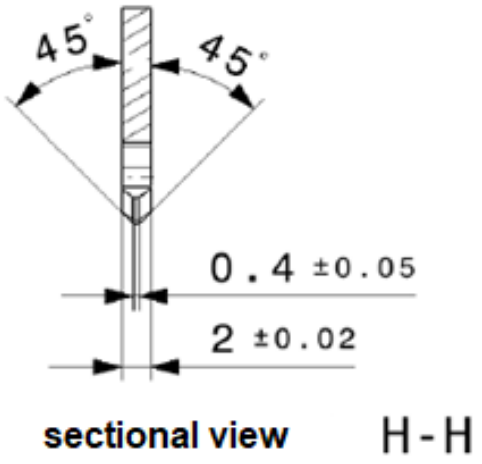
Anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc


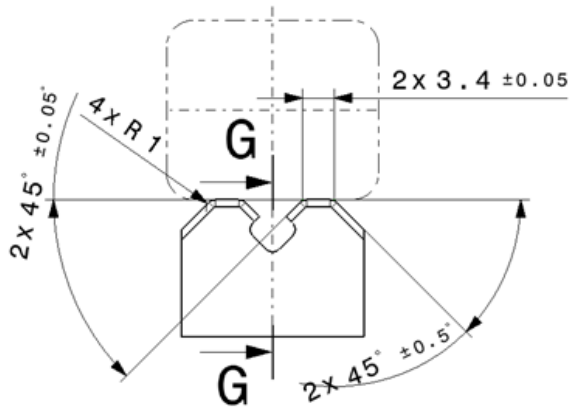
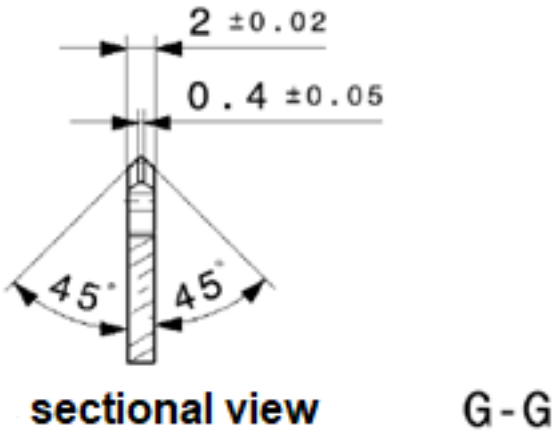
- **Plunger and anvil geometry 3:**

Plunger geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc


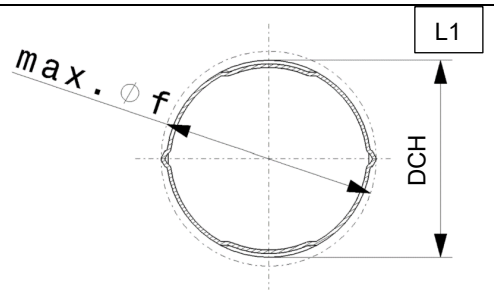
Anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc


- **Plunger and anvil geometry of the contact carrier pressing**

Plunger geometry of the contact carrier pressing	
Material: 1.2721 vacuum hardened 58hrc	
	

Anvil geometry of the contact carrier pressing	
Material: 1.2721 vacuum hardened 58hrc	
	

- **Embossing height - wire shield pressing**

	The plunger and anvil are pressed together until block. Due to this the dimension DCH will be given. Therefore, see table of each cross section.

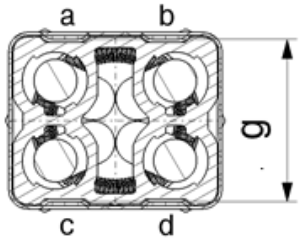
During the pressing process a fold appears on two sides. This fold is not allowed to be bigger than the diameter "**f" = Ø 19.5 mm** referring to the centerline of the wire. The diameter **DCH** must not be measured inside the embossing position but must be measured across the diameter.
In the area of the fold the material of the shielding sleeve is not allowed to be cracked.

Wire manufacturer	**Wire cross section**		
	4x 6.0 mm²	**4x 4.0 mm²**	**3x 6.0 mm²**
Kroschu FHLR2G2GCB2G	Plunger and anvil geometry 1 DCH=16.65 ± 0.1	Plunger and anvil geometry 1 DCH=16.65 ± 0.1 **or** Plunger and anvil geometry 3 DCH=16.65 ± 0.2	Plunger and anvil geometry 1 DCH=16.65 ± 0.1 **or** Plunger and anvil geometry 3 DCH=16.65 ± 0.2
Bizlink FHLR2G2GCB2G			
Coroflex FHLR2GCB2G			
Coficab FHLR2G2GCB2G			
Coficab FHLR91X91XCB91X T3	Plunger and anvil geometry 1 DCH=16.65 ± 0.1	Plunger and anvil geometry 1 DCH=16.65 ± 0.1	-
GG FHLR2G2GCB2G	Plunger and anvil geometry 2 DCH=16.3 ± 0.1	-	-
Acome FHLR2X91YCB91X	Plunger and anvil geometry 3 DCH=16.65 ± 0.2	-	-
Coficab FHLR2GC91X T4	Plunger and anvil geometry 3 DCH=16.65 ± 0.2	-	-

Wire manufacturer	Wire cross section		
	3x 4.0 m²	2x 6.0 mm²	2x 4.0 mm²
NBKBE FHLR2G2GCB2G	-	Plunger and anvil geometry 1 DCH=16.65 ± 0.1	-
Kroschu FHLR2G2GCB2G	Plunger and anvil geometry 1 DCH=16,65 ± 0,1		
Bizlink FHLR2G2GCB2G			
Coroflex FHLR2GCB2G			
Coficab FHLR2G2GCB2G			
Coficab FHLR91X91XCB91X T3	-	Plunger and anvil geometry 3 DCH=16.65 ± 0.2	-
GG FHLR2G2GCB2G	-	Plunger and anvil geometry 2 DCH=16.3 ± 0.1	-
GG FLR31YBC11Y	-	Plunger and anvil geometry 1 DCH=16.65 ± 0.1	-

- **Contact carrier pressing**

The dimension "**g**" = 16.2 ± 0.1 will be given by pressing together a-c und b-d.

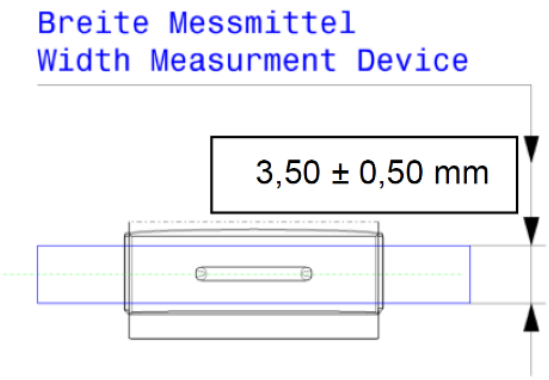
	Both pressings must be done at the same time.

- **Check measurement of pressing height shield crimp**

To check dimension “**f”**, a gauge with an inner diameter of **19.5 mm** must be used.
It is also permissible to measure dimension **“f”** with a caliper under the following conditions:
Place the caliper jaws perpendicular to the diameter axis without tilting, applying light, even pressure; take two measurements at each of at least three positions; all individual values must be **< 19.5 mm**.

To check the dimension “**g”** the height needs to be measured acc. to the drawing. To check the dimension “**DCH”** the height needs to be measured acc. to the drawing. The diameter **DCH** must not be measured inside the embossing position but must be measured across the diameter. All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.
(Micrometer, measuring range: 0-25 mm). The measuring device for the measurement must have a width of 3.5 ± 0.5 mm. The measurement must be taken symmetrically to the embossing position.

Reverence picture from the process specifications HPS40-2
 

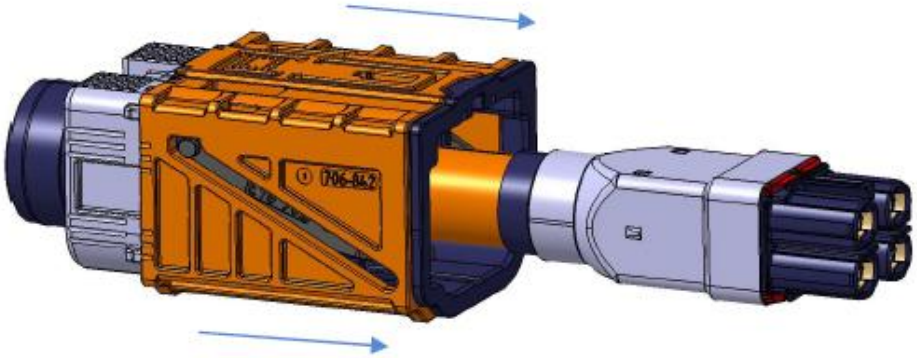
- **Pulling force of the wire**

To measure the pull-off force, the wire must be clamped firmly into a clamping device. The distance between the clamping position of the wire and the fixing tape should be about 70 mm. The connector must be fixed on the shielding sleeve at the transition between the largest and the second largest diameter.

HCT4 female terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached

Wire cross section	Pulling force
2x 4.0 mm²	≥ 120 N L2
2x 6.0 mm²	≥ 120 N L2
3x 4.0 mm²	≥ 120 N L2
3x 6.0 mm²	≥ 120 N L2
4x 4.0 mm²	≥ 120 N L2
4x 6.0 mm²	≥ 120 N L2

4.11 Positioning of the locking sleeve

The locking sleeve must be assembled power assisted, and in the correct position.


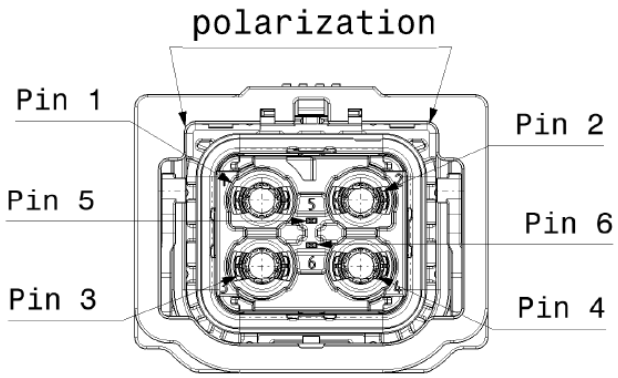
For the positioning and the assembling process of the locking sleeve onto the wire unit, the assembling device (Hand device) of the company WKM can be used.

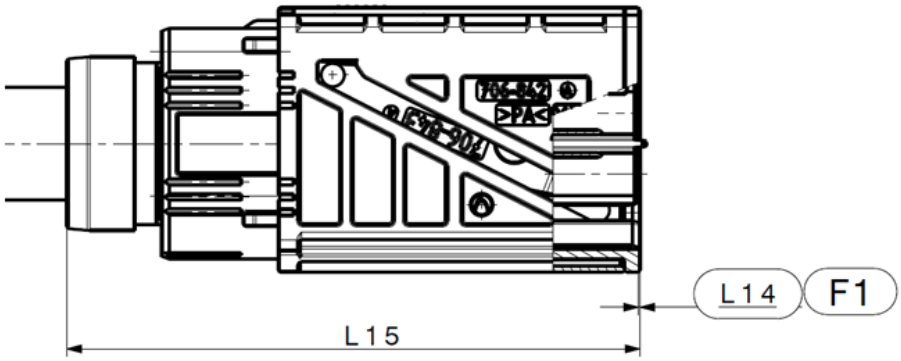
Name of the device: Assembling device HPS40 4+2PIN
Article number: 196998

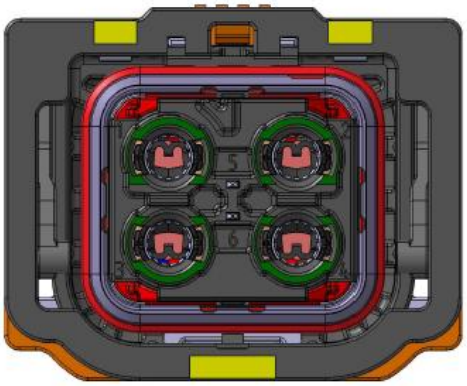
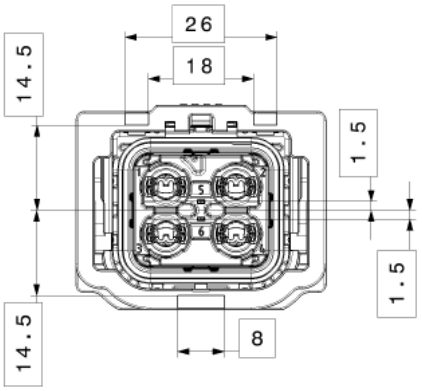
Based on the processing guidelines of Hirschmann Automotive GmbH, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier. Each manufacturer is responsible of the commissioning of the pressing device.

WKM – Maschinenbau GmbH
Oberes Ried 15
A-6833 Klaus
Tel.: +43 5523 / 54907

The commissioning of the pressing device must be done through the manufacturer. In this edition you can only find the assembling data of the pressing process.



The contact carrier incl. the shielding sleeve needs to be assembled into the locking sleeve in the correct position.	
	L14 = 0.2 ± 0.1 L15 = 75.3 (Info)

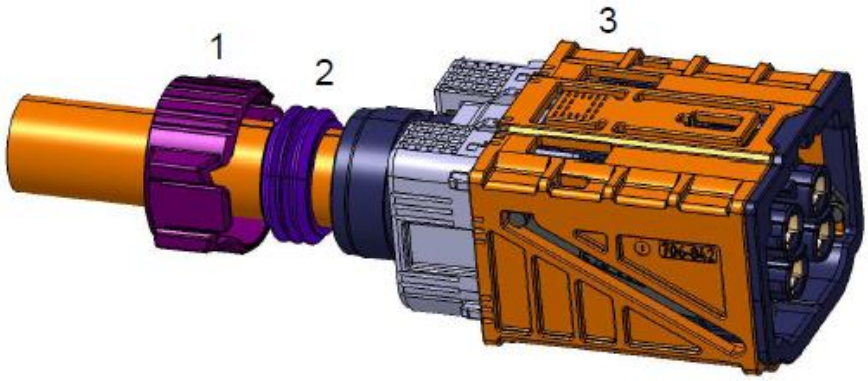
The locking sleeve must be assembled onto the shielding sleeve force assisted until the dimension L14 is reached.	
	

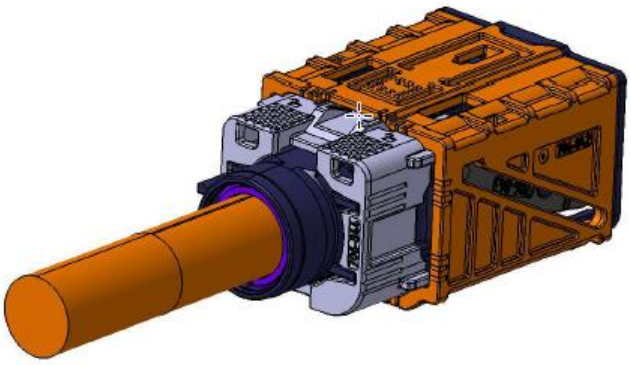
For a defined measurement of L14 dimension, the locking sleeve and contact carrier parts should be placed / measured on the reference surfaces.

- Locking sleeve reference surface (see picture yellow marked)
- Contact carrier reference surface (see picture green marked)

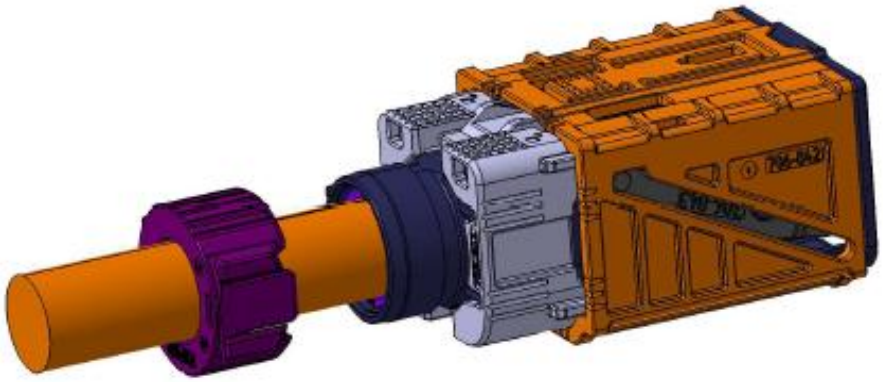
The dimension L15 is only for checking purposes. During the assembling process, there are no damages allowed on the shielding sleeve, the contact carrier, or the sheathed cable. Pulling on the sheathed cable is not necessary. The wire insulation of the HV wire must not be pulled out from the ferrule crimp / strain relief.

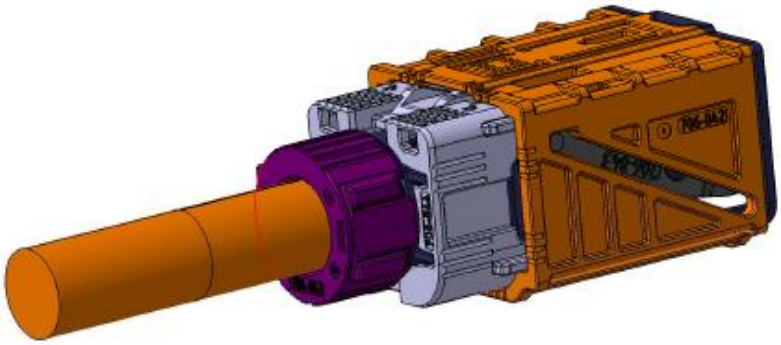
4.12 Assemble seal and cover cap

Push wire seal (2) into the locking sleeve (3).


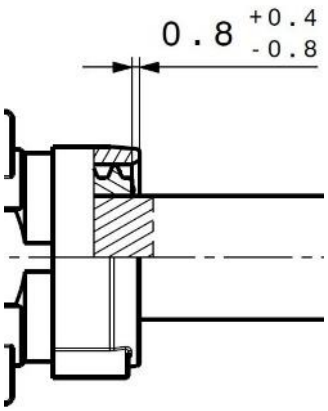
The wire seal can be slightly widened during assembly.


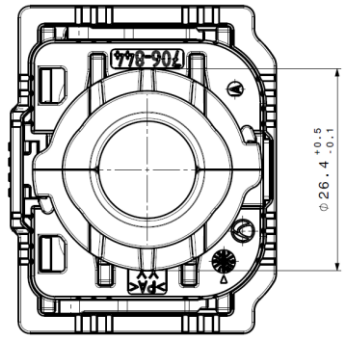
It is possible to move the wire seal with the cover cap (1) on the wire, but care must be taken that the wire seal does not twist and is not clamped or damaged. Damages on the sealing lips are not permitted, frontal markings are permitted.

Snap the cover cap (1) into the recess of the locking sleeve (3) and considers the polarization.


Do not damage the cover cap (1) or the wire seal (2) during assembly.


The wire seal can be slightly expanded during assembly. Damage to the seal lips is not permitted, but imprints on the face of the seal are permitted.

	The seal must be pressed into the locking sleeve to up to 0.8 mm +0.4/-0.8 during assembly.

	The measurement 26.4 +0.5/-0.1 can be used as a check. Measuring this dimension does not guarantee that the parts are closed.

The cover cap (5) and wire seal (1) should not be damaged during assembly

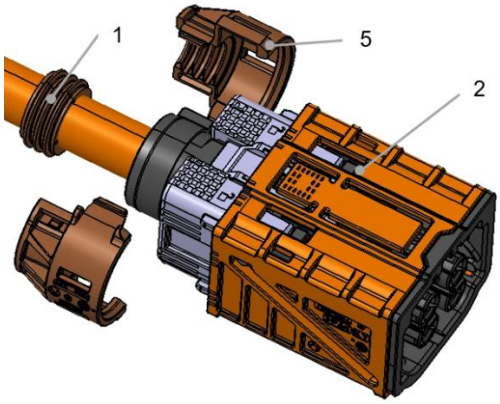
4.13 Assemble the wire seal and cover cap (Option article no. 706-780-xxx)

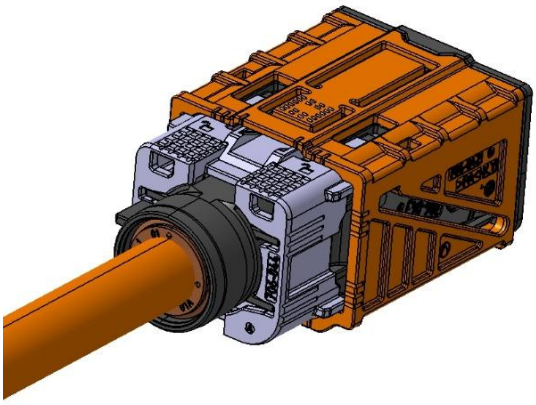
For the pressing process of the retaining cap, a device can be requested from WKM Maschinenbau GmbH.

Description:	Retaining cap latching HPS40 4+2 Female
Material number:	Will be distributed by WKM Maschinenbau GmbH

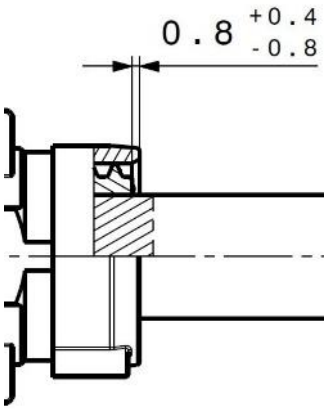
The device was developed based on the data provided by Hirschmann Automotive. The individual details, regarding assignment, handling and process description of the fixture, can be requested directly from the supplier.

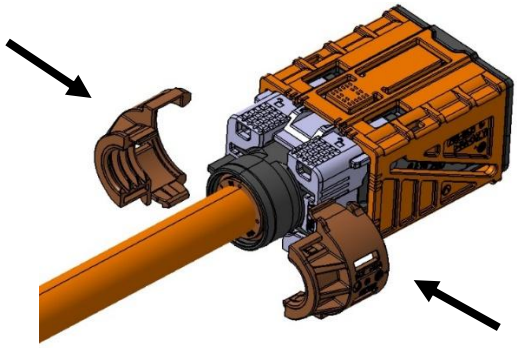
WKM Maschinenbau GmbH
Oberes Ried 15
A – 6833 Klaus
Tel. +43 5523 54907-14
Klien.m@wkm.at
www.wkm.at

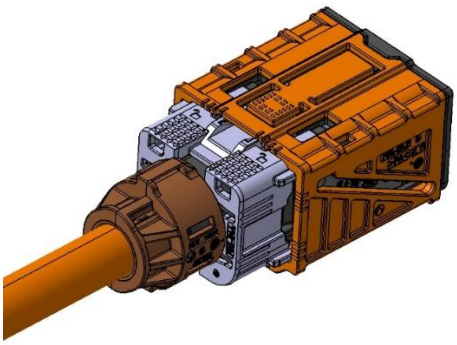
1	5	2
		

Slide the wire seal (1) into the locking sleeve (2)


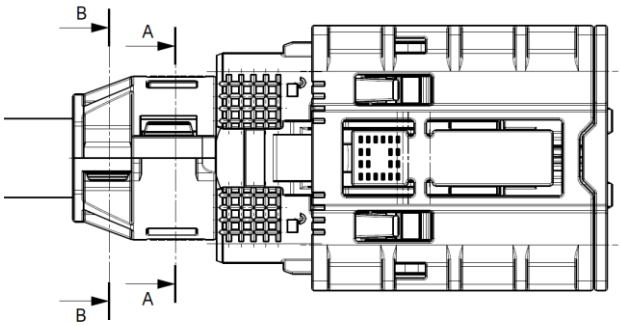
The wire seal can be slightly expanded during assembly. Damage to the seal lips is not permitted, but imprints on the face of the seal are permitted.

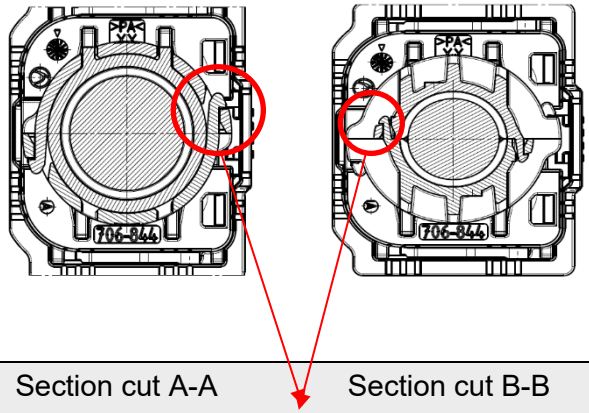
	The seal must be pressed into the locking sleeve to up to 0.8 mm +0.4/-0.8 during assembly.
Connect the cover cap (5) over the recess provided in the locking sleeve (2). A press can be used for this assembly process. The holding of the retaining caps in the press, as well as the application of pressure, should take place over a surface that is as large as possible.	





Cover cap in end position

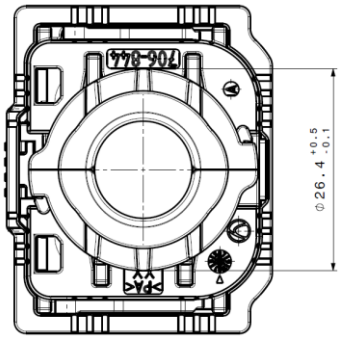




Section cut A-A Section cut B-B

Both locking hooks in end position.

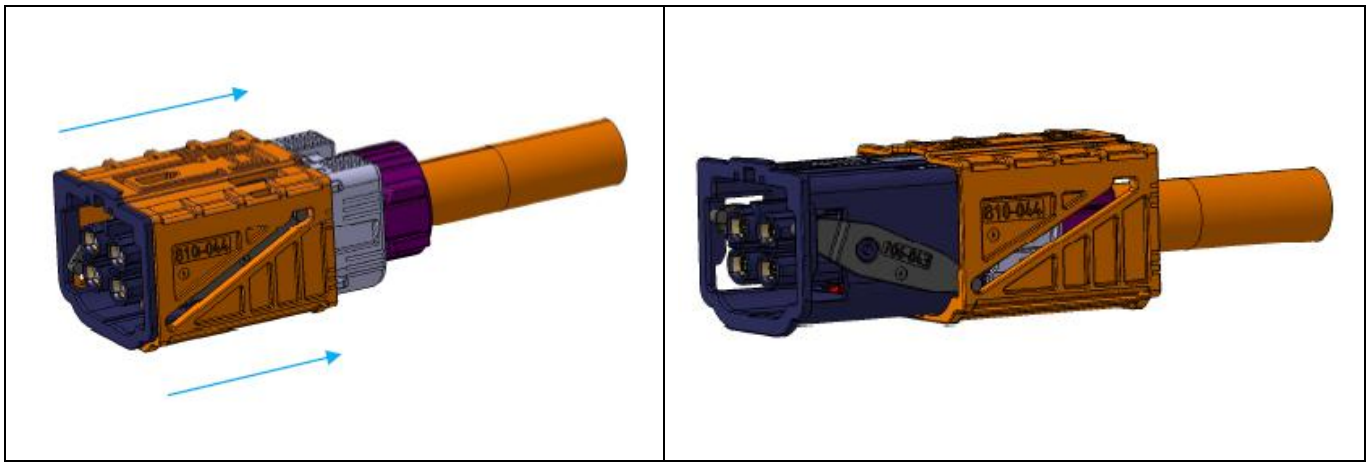
After assembly, make sure that the locking hooks are locked in place.



The measurement 26.4 +0.5/-0.1 can be used as a check. Measuring this dimension does not guarantee that the parts are closed.

The cover cap (5) and wire seal (1) should not be damaged during assembly

4.14 Slide lever into end position



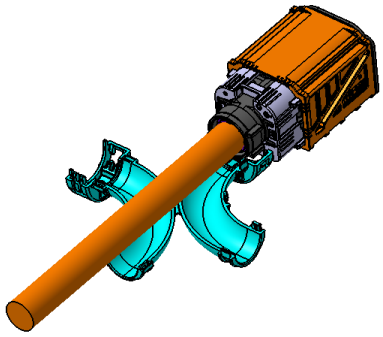
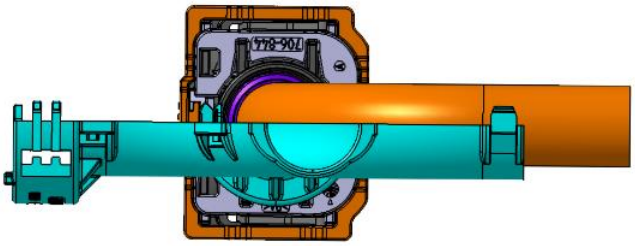
After assembling, the lever must be slide into end position.

4.15 Delivery of produced harness

For a process capable and controlled delivery of produced harnesses to quantitatively free defined bundles.

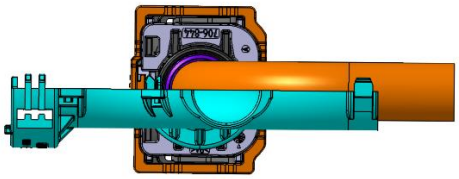
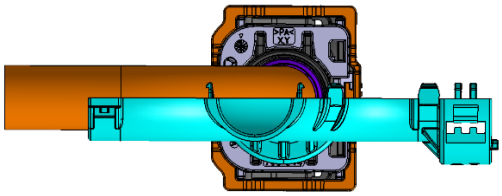
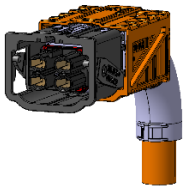
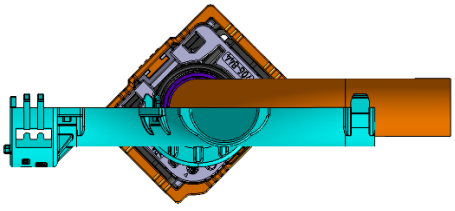
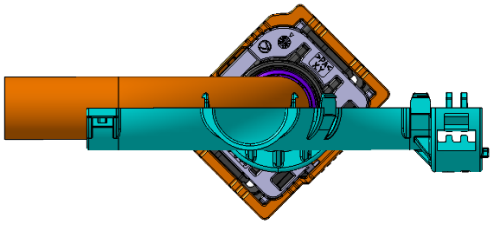
5 Processing steps (optional parts)

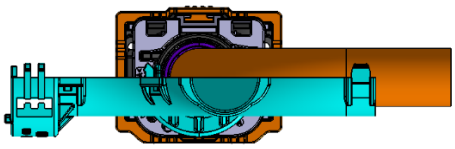
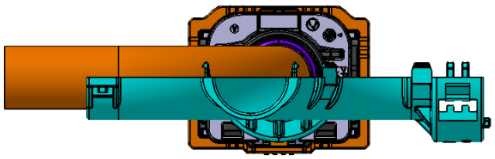
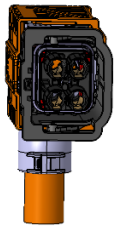
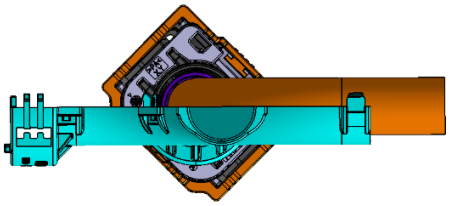
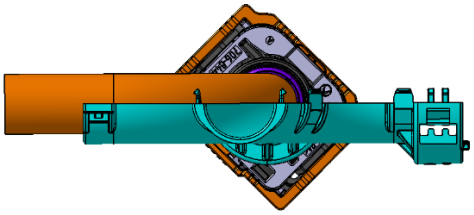
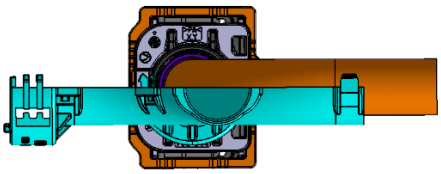
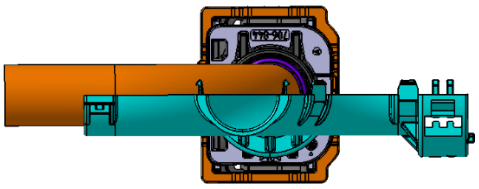
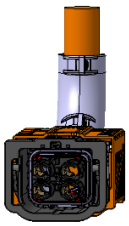
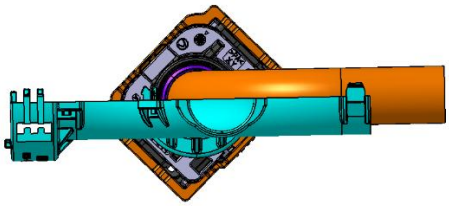
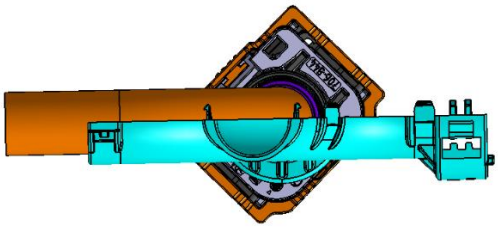
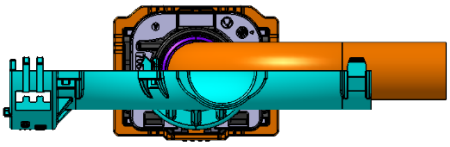
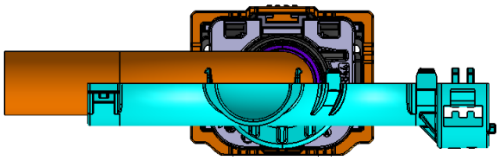
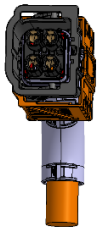
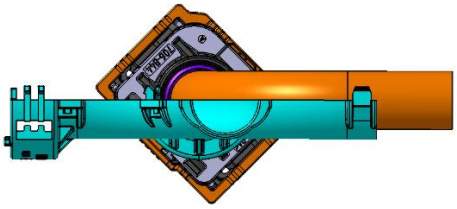
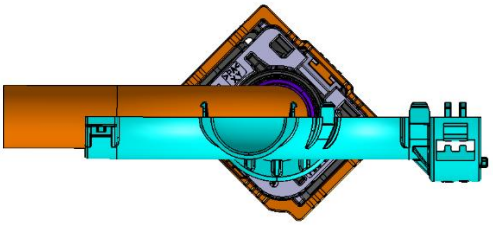
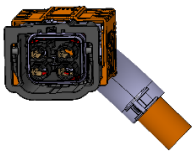
5.1 Assemble 90° angled cap

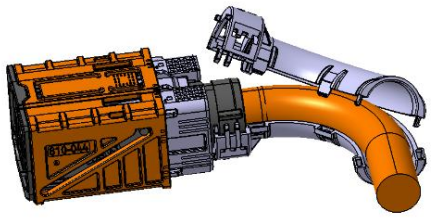
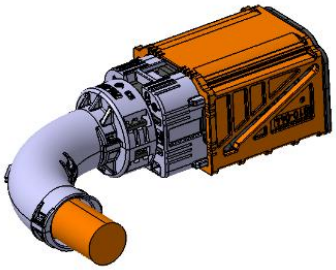
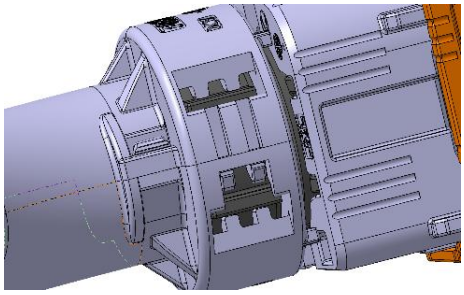
This process steps are only necessary if the 90° angled cap is used instead of the cover cap.	
	

The orientation of the wire direction will be fixed with the polarization geometry of the connector housing. The wire direction of the angle cap is conceived to be set in 45° angles during the assembling process. The polarization geometry should be placed in one side of the half-shell to get a pre orientation. (left side) It is possible to place the connector into the angle cap without pre orientation (right side) but be aware during closing that the polarization geometry finds the correct position.

The position -90° can only be placed in one side, because on the other side there will be a collision of the half-shells with the polarization geometry during closing of the angle cap.

0°			
45°			

90°			
135°			
180°			
-135°			
-90°			
-45°			

Bend the wire for 90° and inset it into the half-shell of the angled cap.		
		

During closing the angled cap, make sure the wire insulation material doesn't get damaged. Take care that only the multi core cable is allowed under the angled cap. No Tape, protective tube, or other additional parts is allowed. All five latching hooks must be locked. Once the angled cap is closed, it is not possible to change the angle anymore.

6 Technical information

6.1 General requirements

Damages on the single components are not allowed during the whole production process.

6.2 Technical cleanliness

In general, pay attention to the cleanliness on the connector and inside of the connector. Metallic particles generated during the assembly process, must be removed with a suitable device. Inside the connector and on the connector, there are no metallic particles > 1000µm allowed.

For metallic particle at each connector: CCC = N (J4/K0) acc. to VDA Band 19
For all other particle at each connector: CCC = N (J10/K0) acc. to VDA Band 19

BMW-specific requirements according to QV11111 for assembled connector can be seen in the following table. The surface information can be found in the customer drawings.

Technical cleanliness acc. to QV11111			
HV systeme (assembled final product without cable)			
Requirement class (t.b.d. → BMW – manufacturer)			
Reference size A (1,000 cm²)			
Number of allowable particle by length size class			
		NOT shiny metallic	shiny metallic
H	200 - 400µm	1,200	1,200
I	400 - 600µm	130	130
J	600 – 1,000µm	60	15
K	1,000 – 1,500µm	4	-

7 Change of documentation

Version	Change description	Change date	Edited
1	First edition	05/ 2018	Bas Ü.
2	Updated the process specification: Added parts for additional wire cross sections, added article number for suggested Crimp and assembly machines, added other current documents,	07/ 2019	Shaw S.
3	Updated pictures single components; Other current documents updated; Processing steps updated: see dimensions L1,L4,L4.1,L5,L5.1,L6,L7,L9 Max. outer diameter tape adapted; Plunger and anvil geometry & pos. (L10, L11) for shield pressing operation updated; Correction of the values – mounting force HCT4 female terminals;	02/ 2020	Kleiner T.
4	Adjustment/correction change of documentation Edition February 2020; Other current documents and product structure sheathed cable – GG-Yard goods added; Single Components for 2x 6.0 mm² / Ø11.1-11.7 added; Processing step 4.4: foil overlap, dimension added; Processing step 4.4.1: ferrule crimp position dimension (0±0.2) as clamp dimension / tool dimension defined, L1.1 added, ferrule crimp pressing dimension added; Processing step 4.7: Pin assignment removed; Processing step 4.10.2: L10 & L11 as clamp dim. / tool dim. defined; Processing step 4.11: reference surface for measurement L14 added; Processing step 4.12:update of seal assembly: frontside marking allowed;	06/ 2020	Kleiner T.
5	Small series part numbers added – section 3.3, 3.4, 3.5, 3.6, 3.7 and 3.8;	07/ 2020	Grobnicu V.
6	Customer- releases – section 2.2 added	08/ 2020	Grobnicu V.
7	4.4.1. Ferrule crimp machine – order number changed to 3000; Permitted scratches picture added; Changed F-characteristics; text 4.7 added; Chapter 2.1: adapted table;	11/ 2020	Grobnicu V./ Shaw S.

8	Chapter 2.2: added comment to characteristic F1 & F1-characteristic in process step 4.5/4.7 added; Chapter 3.3, Ferrule crimp – corrected image description; process step 4.4: added permitted deviation for 4x 6.0 mm²; process step 4.5: aligned L4 dimension (increased tolerance); Process step 4.6: aligned L6 dimension (increased tolerance); Process step 4.7: aligned dimension 62.1±1,3 to 64.45 (increased tolerance); Chapter 2.4/3.1/4.10.5: Coficab sheathed cable added; Chapter 4.10.5: Comment measuring dimension Ø16.65 added;	02/ 2021	Kleiner T./ Shaw S.

9	Chapter 3.3: new ferrule crimp articel no. for cross section 4x 6.0 mm² and 3x 6.0 mm² added; // Chapter 4.10.6: Note removed -> "The exact dimensions ... still have to be validated"
	Chapter 4.4.1: stamp geometry for ferrule crimping added;
	Chapter 3.8: HA-Index for serial tooling Locking Unit Assembly without DMC added; // Chapter 4.3 & 4.4.1: Added possibility to adjust the stripping length in relation to the adjustment of the ferrule crimp position;
		03/ 2021	Kleiner T.

10	Chapter 3.1/3.3/3.5/3.6: Correction of wire diameter for 4x 4.0 mm² wire (Ø12,7-13,3); Chapter 3.8: added information „OEM specific“ to Lasermarking; for 810-044-501; added wire manufacturer NBKBE;	07/ 2021	Kleiner T./ Schwer A.
11	Chapter 3.4: shielding sleeve with Ø16.9 added – for reduced assembly force; Chapter 3.8: added 810-044-503 for Volvo and 810-044-504 for neutral customers; Chapter 4.4.1: Crimping dimensions for ferrule crimp adapted for 3x 6.0 mm² Bizlink & Coficab wires;	10/ 2021	Schwer A./ Kleiner T.
12	Chapter 3.1: Supplier production site added; Chapter 3.8: Added to no. 810-044-502 – (Mercedes Benz); Chapter 4.10.3: Plunger and anvil geometry 2 added; Chapter 4.10.7: Pull-off force picture updated; Coroplast Cable changed to Coroflex.	12/ 2021	Grobnicu V.
13	Chapter 4.4.1: Description Plunger/Anvil-geometry for 4x 4.0 mm² ferrule crimp 710-387-502 added; Chapter 4.10.3: Plunger/Anvil-geometry – Alternative geometry 3 added; Chapter 4.10.4: max. dimension f from 19.4 to 19.5 adapted; Alternative Plunger and anvil geometry 3 for cross section 4x 4.0 and 3x 6.0 mm² added. Chapter 2.2: BMW special characteristics changed acc. to OEM requirement. Chapter 4.15: Changed cleanliness requirement and added BMW specific requirement based on surface reference;	10/ 2022	Kleiner T./ Breuss L.
14	Coficab FHLR91X91XCB91X T3 sheated cable added (not validated yet),	01/ 2023	Natter T.

	General updates Process specification (design, table formats, component descriptions) Chapter 3.1. wire variants newly presented Chapter 3.3. Removed pre-series indices (-Axx), added explicit use of ferrule crimp for G&G FHLR2GCB2G 4x6 / T180 cable Chapter 3.4. Pre-series indices and -501 removed Chapter 3.5. Pre-series indices removed (-Axx) Chapter 3.6. Pre-series indices removed (-Axx) Chapter 3.7. Pre-series indices removed (-Bxx) Chapter 3.8. Pre-series indices removed (-Bxx) In chapter 4.4.1. Added stamp geometry explicitly for G&G FHLR2GCB2G 4x6 / T180 line Chapter 4.10.6 Dimension "f" changed from 19.4 mm to 19.5 mm and control dimension Ø16.65 ±0.1 to general DCH according to the table		
15	Update design of specification	06/ 2023	Jussel E-M.
16	Adjusting data of the bottom line	07/ 2023	Jussel E-M.
17	Extension data angled protection cap	08/ 2023	Jussel E-M.
18	Update topic 5.1 with additional pictures	09/ 2023	Jussel E-M.
19	Topic 3.1 added as optional parts	09/ 2023	Jussel E-M.
20	Topic 1.2: adjusted with additional “Miscellaneous”	10/ 2023	Jussel E-M.
21	Topic 1.3, 2.1 added further wire types for 4.0 mm² Page 42 added further wire type and manufacturer	11/ 2023	Jussel E-M.
22	Page 23: Grouting dimension sheath crimp for additional Coficab and Acome cable listed	02/ 2024	Jussel E-M.
23	Page 42: Coficab wire FHLR91X91XCB91X T3 – plunger and anvil geometry 1 Page 43: Coficab wire FHLR91X91XCB91X T3 – plunger and anvil geometry +3	03/ 2024	Jussel E-M.
24	Page 4: Change of L from length to legal	04/ 2024	Jussel E-M.
25	Page 42,11) Update of picture and text	06/ 2024	Jussel E-M.
26	Page 42) Update of picture	07/ 2024	Jussel E-M.
27	Page 44,8) checking and cross-checking with german version	07/ 2024	Jussel E-M.
28	Page 26) Added and adjusted the wording.	10/ 2024	Jussel E-M.
29	Page 31) Adjustment of the text	01/ 2025	Jussel E-M.
30	Topic 4.12) Additional comments and instructions	07/ 2025	Jussel E-M.
31	Page 7+8) Coficab-wire, correction comment of validation. Page 15+16) Additional indices of cover cap Page 53) Additional option of assemble seal and cover cap (PN 706-780-xxx)	10/ 2025	Jussel E-M.

32	Page 7+8) Supplier production plant added Page 16) added Wire data Page 26) Added a remark about possible burrs Page 25+44+45) wires are validated Page 46) Adjustment of the permitted measurement method for the “f” parameter. General renaming from Leoni to Bizlink	10/ 2025	Jussel E-M.
33	Topic 4.13) Correction and adaptation of this topic	11/ 2025	Jussel E-M.